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DECISION-SCIENCE APPLICATIONS

DSA Report No 692

11 MARCH 1986

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**RECONSTRUCTING THE SOVIET NATIONAL ECONOMIC
BALANCE, 1965-1984: AN ALTERNATIVE APPROACH
TO ESTIMATING SOVIET MILITARY EXPENDITURES**

Volume I: Technical Discussion

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**Volume I: Technical Discussion
DRAFT**

DMITRI STEINBERG

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PREFACE

This study constitutes the first attempt to reconstruct the core of Soviet national accounts--called the "National Economic Balance" (NEB)--for the years 1965-1984. NEB tables contain information on all production and service sectors, including those engaged in military buildup. Soviet planners make crucial decisions on the allocation of resources using the NEB data. Western researchers would be in a better position to learn about Soviet civilian and defense economic trends were they able to get access to the data available in the tables compiled by Soviet economic planners. In addition, the NEB provides a unique opportunity to challenge Soviet ideological pretensions using evidence that is commonly available to readers both outside and within the Soviet Bloc.

One can hardly expect that Soviet leaders would ever be willing to disclose the hidden militarist nature of the Soviet state. They are reluctant to reveal not only the true size of the defense budget but also the financial mechanism by which Soviet people carry the defense burden, and how it affects their standard of living and future labor and capital productivity trends. The nature of this mechanism and its destructive impact on the civilian economy is a well-guarded secret of the Soviet state. In the process of preserving these economic secrets, the authors of the official statistics conceal other ideologically damaging facts. These include the role of foreign trade in the allocation of resources from the population to the defense sector, real production and consumption trends and the chronic shortages of material, financial and labor resources caused by an intensive military buildup.

One way to disclose the economic secrets of the Soviet state utilizing the reconstructed NEB is to analyze discrepancies between the officially reported totals and the included totals for the various civilian sectors. For example, the official totals for consumption and investment exceed the totals for civilian consumption and investment. Similarly, household outlays exceed household revenues, the final demand for goods is smaller than the actual available resources of capital and consumer goods, and the total labor force is larger than the civilian labor and armed forces.

The gaps created by Soviet censors consist of two parts: the military component and the concealed civilian component, where the latter is much more easy to estimate than the former. Recognizing this fact, one can estimate military expenditures in three steps: one can (1) establish the size of the gaps in the official data; (2) determine the hidden civilian components of these gaps; and (3) subtract the values of these hidden civilian components from the total value of the established gaps to determine the military components as residuals. Consequently, all civilian economic indicators must be estimated before one can determine the size and impact of the Soviet defense burden. Completing this estimation procedure successfully without using Soviet planning and accounting methods as a guide is virtually an impossible task. It thus becomes clear why Soviet officials apply so much effort to make it difficult even for their own economists to learn about current planning practices.

One of the major objectives of this study is to demonstrate that the NEB can be reconstructed with the desired precision by employing the analytical tools with which Soviet planners first compile the NEB and then present it in the expunged form in the official statistical publications. Many economists are unable to use these publications for the analysis of Soviet economic trends because they do not establish the connection between the official statistics and planning tables. This connection provides a key to deciphering numerous official statistical tables which are purposefully presented in an unsystematic and confusing way.

There are two apparent reasons why this connection has not been established by Western researchers as well as by most Soviet economists. First, no comprehensive manual is available that explains all Soviet planning and accounting methods at least in the civilian economic sector. Only recently have knowledgeable Soviet economists been able to piece these methods together using various planning manuals and personal contact with central planners. However, these economists have not been able to apply these methods to the analysis of official statistical tables. Second, the inability of these economists to obtain information on Soviet defense economic activities is apparently responsible for their failure to decipher the official statistics. Neither Soviet nor Western economists have dared to question the traditional belief that planners treat the end military product as part of the GSP (Gross Social Product) and national income.

This erroneous belief, which was apparently spread by planners themselves in order to conceal planning secrets, has prevented researchers from learning about the place of the defense sector in Soviet national accounts. As a result, researchers have been unknowingly limited to studying only a portion of the military product that equals capital inputs to the defense production. Researchers erroneously assumed that gaps in the official statistics represented the entire Soviet defense output. Wages and other value added components of the Soviet defense output have completely eluded researchers' attention.

The traditional Western view, which has served as the foundation for the work of almost all Western analysts, can be traced to the pioneering work of Abraham Becker. On the basis of his study of published Soviet statistics, Becker concluded that: (1) that the officially reported Soviet defense expenditures were far too small to reflect the actual costs of their programs; (2) that the data was presented in a deliberately confusing form; and (3) that the data at least appeared to contain numerous inconsistencies that might be deliberately designed to mislead Western analysts. Becker's original assessment of the confusing nature of the published Soviet statistics was based on the natural assumption that the manufacture of military equipment was included (but somehow disguised) within published GSP statistics. This assumption, which seemed logical at the time, has become progressively less tenable as Soviet defense production has expanded into one of the largest sectors of the economy.

Over the years, there has been an accumulation of evidence that, despite the apparent inconsistencies, the published Soviet data are drawn directly from the same economic statistics that are actually used by Soviet planners. But the confusing structure of the published data has persisted as a continuing barrier to the systematic exploitation of this data. Nevertheless, there has been a growing body of opinion among thoughtful analysts that the published Soviet statistics

constitute an important information resource that should be more systematically exploited to supplement the CIA estimating procedure based on quantifying the physical output of the Soviet defense industry. William T. Lee has been one of the most effective and successful advocates of this view. Lee devised and later published a methodology for estimating the Soviet defense expenditures based on an analysis of the gaps or residuals in the published Soviet economic data. Similar to Becker's work, Lee's methodology has influenced the whole generation of students of the Soviet economy, including the author of the present study.

The major findings presented in this study indicate that although the size of Soviet military expenditures is within the upper boundaries set by many CIA critics, their work must be treated as speculative. Even if these critics were able to estimate the final demand of defense organizations, they would have still underestimated the total size of Soviet military expenditures by the amount of defense production sector's value added, which accounts for around one fifth of the total defense burden.

CIA analysts who estimate Soviet military expenditures by combining technological means of intelligence and Soviet budgetary statistics make a different type of error by assuming that the defense production sector earns profit. In order to compare the Soviet and U.S. armaments production, one must artificially add profit to the estimated Soviet weapons procurement bill. In Soviet national accounts, the defense budget is thus significantly underestimated in comparison to its Western counterparts.

There is another reason why the estimates of Soviet military expenditures based entirely on Soviet budgetary statistics are unreliable. The finding of this study indicate that during most of the observed period Soviet leaders had to resort to the Western practice of budgetary deficits because the Soviet state could not collect enough revenues to pay for the expensive military program. The major cause of budgetary deficits appears to be the shortage of consumer goods. Unable to spend their income, households keep a significant part of their earnings out of state controlled monetary circulation. This practice not only devalues the ruble but also has a negative effect on labor productivity. Employees' financial rewards evident in the rise of wages are not supported by material rewards.

The consumer demand remains unsatisfied largely because the defense sector deprives the consumer sector of sufficient labor and capital resources for both expanding its production base and improving the quality of its output. The Soviet military drive is thus responsible for both the declining growth rates and the current financial crisis that poses the most serious challenge to the Soviet planning system. The reason for the decrease of budgetary deficits during the second half of the 1970s lies in the sudden increase in foreign trade revenues collected mainly from sales of imported consumer goods.

Even though the recent defense budget comprises as much as 15 percent of the Soviet GNP, this percentage share does not reveal the true Soviet preparedness for war for three reasons. First, this share would be much higher if measured in constant 1970 rubles. According to this author's estimates, Soviet military expenditures equaled 103 billion rubles in constant 1970 prices in 1980. The upper bound of CIA estimates for this year in 1970 rubles is 79 billion rubles. The U.S.

intelligence community thus underestimates the Soviet defense burden by almost a quarter (23.8 percent). Second, the weapons procurement bill is proportionally much larger in the Soviet than in the U.S. defense budget. This fact explains how the Soviet Union is able to compete successfully with the U.S. in the arms race. Third, because CIA and other Western analysts underestimate the size of the Soviet GNP, their estimates for the ratio between the defense burden and GNP appears exaggerated. The results of this study in the area of value added of service and defense sectors lead to the Soviet GNP that exceeds Western estimates by 45-50 billion current rubles or by 6-7 percent for the early 1980s.

The presentation of Soviet national accounts proposed in this study is divided into six parts, of which Part I serves as the introduction. The topics discussed in Section 1 are: the NEB role in the planning process, methods of storing civilian and defense economic data, problems of comparison with Western GNP accounts, issues of hidden inflation and the second economy. The topic of Section 2 is the structure and compilation of the Unified Balance which integrates all economic data. Section 2 thus serves as a summary of detailed estimation procedures described in Parts II to VI with respect to particular segments of the Unified Balance. These include:

- the GSP accounts containing data on the supply and end use of capital and consumer goods;
- the national income and financial accounts dealing with sources, transfers and the end use of revenues;
- the foreign trade balance in gold and domestic rubles;
- demographic trends and labor resources;
- the structure of fixed and working capital;
- labor and capital productivity trends; and
- the unified accounts of the defense economy.

Detailed estimates of the economic activities described in each of the eleven sections of this study are compiled accordingly as a series of working tables in Volume II. These tables are referred to as working tables because, for the most part, they serve as the intermediate step between the published Soviet statistical source tables and the comprehensive unified economic balance. These working tables are presented in the 1965-84 time-series format; the proposed method of reconstructing the NEB can be applied to the post-1984 period upon the release of new official Soviet statistical publications.

Although the text provides an outline of the basic procedures used and problems encountered in constructing the working tables, it does not provide a detailed table-by-table or element-by-element annotation of the reconstruction process. It is expected that such a detailed annotation of the reconstruction will be included in the form of reference data in a later report on the reconstruction process.

A list of abbreviations of Soviet terms is presented at the beginning of this study under Reference Information. A comprehensive list of the source tables used to compile the NEB is enclosed as well.

No findings presented in this study would be possible without the generous support given by the Net Assessment Office of the U.S. Department of Defense over the last three years. Individual acknowledgements are due to David Epstein, Andrew Marshall and Dennis Ross. Sergei Freidzon, a former Soviet planner, was first to introduce me to the idea, developed by the Soviet academician S. Strumilin, that the end military product should be excluded from the published Soviet output and national income. Freidzon was also the first to express the belief in the possibility of reconstructing Soviet economic statistics through the systematic application of planning methods. Altogether, his pioneering work in the field of Soviet economic theory and planning provided that initial inspiration without which the very launching of the present study would have never materialized. I would like to thank Decision-Science Applications, Inc., particularly George Pugh and Michael Zelina, for allowing me to use the IBM PC to simplify cumbersome calculations, for advising me on how to improve the presentation of this study, and for organizing the editorial support. Igor Birman and Albina Tretyakova were extremely kind in clarifying some of the most arcane aspects of the Soviet planning and accounting and in introducing me to several informative Soviet studies that would have otherwise eluded my attention. It goes without saying that I alone am responsible for all errors contained in this study and that my views do not represent those of the U.S. Government. Special thanks to Debbie Mego for providing encouragement during the entire period of completing this study.

LIST OF ABBREVIATIONS AND ACRONYMS

AFCS	-	Adjusted Factor Cost System
CEMA	-	Council of Mutual Economic Assistance
fne	-	Financing national economy
GKNT	-	USSR State Committee for Science & Technology
Gosplan	-	State Planning Commission
GSP	-	Gross Social Product
GVO	-	Gross Value of Output
KGB	-	Committee of State Security
MBMW	-	Machine Building and Metalworking
ME	-	Machinery and Equipment
MF	-	Publication of budgetary statistics by the USSR Ministry of Finances
MVD	-	Ministry of Internal Affairs
NDP	-	Net Domestic Product
NEB	-	National Economic Balance
NFI	-	Net Fixed Investment
NI	-	National Income
NKh	-	Narodnoe Khoziastvo SSSR
PNI	-	Produced National Income
SCF	-	Social Consumption Funds
T&C	-	Transportation and Communication
T&D	-	Trade and Distribution
TSU	-	Central Statistical Administration

USSR Gosstab	-	The Committee for Material- Technological Supply
VPK	-	Commission for Defense Industry
VS	-	Vestnik Statistiki - Official monthly TSU publication
VT	-	Vneshnyaya Torgovlya SSSR

SOURCE TABLES FOR THE SOVIET NATIONAL ECONOMIC BALANCE

CODE	<u>NARODNOE KHOZYAISTVO SSSR (NKh)</u>	NKh EDITIONS
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DEMOGRAPHIC AND LABOR STATISTICS

NK1	Total Population, Men and Women	1965-1984
NK2	Population According to Sources of Income	1965-1984
NK3	Number of Newborn	1965-1984
NK4	Pre-School Children	1965-1984
NK5	Students	1965-1984
NK6	Students in Higher and Special Education	1965-1984
NK7	Pensioners	1965-1984
NK8	Productive and Non-Productive Labor	1965-1984
NK9	State and Cooperative Employees	1965-1984
NK10	Industrial State and Cooperative Employees	1965-1984
NK11	Agricultural Cadres	1965-1984
NK12	Female State and Cooperative Employees	1965-1984
NK13	Female Collective Employees	1983-1984
NK14	Women in Higher and Special Education	1965-1984

PRODUCTION STATISTICS

NK15	Gross Social Product by Sector	1965-1984
NK16	Industrial GVO (Mining and Manufacturing)	1965-1984
NK17	Industrial Groups "A" and "B"	1965-1984
NK18	Industrial Group "A"	1965-1984
NK19	Industrial Group "B"	1965-1984
NK20	Industrial GVO by Sector	1965-1984
NK21	Industrial Production Outlays by Sector	1965-1984
NK22	Industrial Material Outlays	1982-1984
NK23	Structure of Industrial Prices	1965-1979
NK24	Fuel and Power Balance	1965-1984
NK25	Automated Machinery	1965-1984
NK26	Machinery for Agriculture	1965-1984
NK27	Consumer Cultural and Everyday Items	1965-1984
NK28	Agricultural GVO in Constant Prices	1965-1984
NK29	Commodity Agricultural Production	1965-1984
NK30	Procurement of Agricultural Commodities	1965-1984
NK31	Agricultural Collectives	1965-1984
NK32	Large State Farms	1965-1984
NK33	Joint Construction Ventures	1965-1984
NK34	Fishing Collectives	1983-1984
NK35	Production Outlays in Collectives	1983-1984
NK36	Production Outlays in Large State Farms	1983-1984

CODE	<u>NARODNOE KHOZYAISTVO SSSR (NKh)</u>	NKh EDITIONS
NK37	Transportation Freight	1965-1985
NK38	Passenger Transportation	1965-1984
NK39	Railroad Freight	1965-1984
NK40	Factor Cost in Transportation	1965-1975
NK41	Communication GVO	1965-1980
NK42	Capital Installation in Social Sectors	1965-1984
NK43	Capital Installation in Economic Sectors	1981-1984
NK44	Capital Investment in Social Sectors	1965-1984
NK45	Structure of Capital Investment	1965-1984
NK46	Structure of Capital Investment for Production Sectors	1965-1984
NK47	Capital Investment in Economic Sectors	1965-1984
NK48	Capital Investment in State Production Sectors	1981-1984
NK49	Capital Investment in Industrial Sectors	1965-1984
NK50	Agricultural Investment--State, Collective	1965-1984
NK51	Unfinished Construction by Sector	1965-1984
NK52	Construction Works without Collectives	1965-1984
NK53	Construction Works with Collectives	1965-1984
NK54	Construction Design Works	1965-1984
NK55	Geological Works	1981-1984
NK56	State Housing Investment	1965-1984
NK57	Trade Outlays	1965-1980
NK58	Cost Structure in Retail Trade	1965-1980
NK59	Cost Structure in Dining	1965-1980
NK60	Distribution Cost for Fruits, Vegetables	1981-1980
NK61	Everyday Services in Constant Prices	1965-1980
NK62	Department I and II	1973
NK62	Supply of Industrial, Agricultural Goods	1973
NK63	1966 and 1972 Input-Output Tables	1973
NK64	Agricultural-Industrial Complex (AIC)	1983-1984
NK65	Industries Processing Agricultural Materials	1983-1984

NATIONAL INCOME AND FINANCIAL STATISTICS

NK66	Average Monthly Wages by Sector	1965-1984
NK67	SCF per Worker and Service Person	1965-1984
NK68	Produced National Income by Sector	1965-1984
NK69	Consumption, Investment in Constant Prices	1965-1984
NK70	Consumption, Investment in Current Prices	1965-1984
NK71	Social Consumption Funds (SCF)	1965-1984
NK72	Family Budget of Workers and Service Person	1980-1984
NK73	Family Budget of Collective Farmers	1965-1984
NK74	Family Budget of Industrial Workers	1965-1984
NK75	Organized Household Savings	1965-1984

CODE	<u>NARODNOE KHOZYAISTVO SSSR (NKh)</u>	NKh EDITIONS
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NK76	Major Retail Trade Indicators	1965-1984
NK77	State, Collective and Ex-Village Trade	1965-1984
NK78	Structure of Retail Trade	1965-1984
NK79	Retail Trade Inventories	1965-1984
NK80	Financial Accumulations	1965-1984
NK81	Net Profit by Sector	1965-1984
NK82	Distribution of Total Profit	1965-1984
NK83	Distribution of Industrial Profit	1965-1984
NK84	Net Industrial Profit by Sector	1965-1984
NK85	Industrial Profitability by Sector	1965-1984
NK86	Profit in Trade	1965-1984
NK87	Profit and Profitability in T&C	1965-1984
NK88	Financing of Working Assets by Sector	1965-1980
NK89	Bonus Funds by Sector	1965-1984
NK90	Structure of Bonus Funds	1965-1984
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NK94	Total Outlays on Services and Science	1965-1984
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NK97	Credits by Sector	1965-1984
NK98	Short-Term Credits by Sector	1965-1984
NK99	Exports and Imports in Gold Rubles	1965-1984
NK100	Structure of Exports and Imports	1965-1984

FIXED AND WORKING CAPITAL

NK101	Fixed Capital by Sector in Current Prices	1972-1974
NK102	Structure of Fixed Capital	1972-1973
NK103	Fixed Capital of Profit-Seeking Sectors	1972-1973
NK104	Fixed Capital of Budgetary Sectors	1973
NK105	Fixed Capital by Sector in Constant Prices	1965-1984
NK106	Balance of Fixed Capital	1974, 1982
NK107	Input-Output Table on Fixed Capital	1974
NK108	Industrial Fixed Capital by Sector	1965-1984
NK109	Structure of Industrial Fixed Capital	1965-1984
NK110	Industrial Depreciation Rates by Sector	1965-1984
NK111	Industrial Installation, Liquidation Rates	1965-1984
NK112	Structure of Agricultural Fixed Capital	1974-1984
NK113	Capital of Collectives	1965-1984
NK114	Capital of Large State Farms	1965-1984
NK115	Capital of Small State Farms	1965-1984

CODE	<u>NARODNOE KHOZYAISTVO SSSR (NKh)</u>	NKh EDITIONS
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NK116	Livestock in Physical Units	1965-1984
NK117	Gardening in Physical Units	1965-1984
NK118	New Housing Construction by Social Sector	1965-1984
NK119	USSR Housing Fund	1965-1984

NK120	Working Assets by Sector	1965-1984
NK121	Structure of Inventories	1965-1980
NK122	Structure of Inventories in Industry	1965-1980
NK123	Structure of Inventories in Industrial Sectors	1965-1972
NK124	Structure of Inventories in Agriculture	1965-1980
NK125	Structure of Inventories in Construction	1965-1980
NK126	Structure of Inventories in Trade	1965-1980

GROWTH RATES AND PRICES

NK127	Major Economic Indicators	1965-1984
NK128	Industrial GVO, including "A" and "B"	1965-1984
NK129	Industrial GVO by Sector	1965-1984
NK129	MBMW Sectors	1965-1984
NK131	Industrial Labor Productivity	1965-1984
NK132	Capital and Inventories by Sector	1965-1984
NK133	Industrial Capital-Labor Ratio	1965-1984
NK134	Industrial Price Index without Turnover Tax	1965-1979
NK135	Industrial Price Index with Turnover Tax	1965-1979
NK136	Agricultural GVO for All Farms	1965-1984
NK137	Construction Price Index	1965-1984
NK138	Communication GVO	1981-1984
NK139	Standard of Living Index	1965-1984
NK140	Retail Trade Turnover	1965-1984

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PART I
INTRODUCTION

1.0 INTRODUCTION TO SOVIET NATIONAL ACCOUNTS

1.1 THE NEB AND SOVIET PLANNING

Soviet planners compile the National Economic Balance (NEB) as an integrated system of statistical tables during the preparation and analysis of state plans of economic and social development.¹ Planners use the NEB as a way to systematize their knowledge about Soviet economic activities and to test the feasibility of achieving particular annual and long-term objectives. It would not be an exaggeration to observe that planners make no decision without integrating their planning objectives inside the framework of the NEB tables.

During the past decade Soviet economists have focused on the NEB in connection with planners' attempts to shift the economy from extensive to intensive means of development.² The latter is characterized by the efficient use of resources rather than wasteful expansion of the economy. In Soviet-type economies the efficiency criteria is a function of the planners' ability to balance the production and end use of goods, to sustain the proportional growth of production and service sectors, to optimize the size of consumption and investment components of national income, and to integrate the flow of goods and financial resources.

The planners' ability to regulate the economy depends on their control over the elaborate price mechanism which is used to channel resources from household to defense sectors. When the supply of money greatly exceeds that of goods and services available for end use, efficient application of the price mechanism becomes an impossible task. Employees accumulate excessive savings and hence lack incentives to increase their productivity. Also, a greater and greater part of household revenues remains outside the planners' control. This income, which is referred to here as unorganized savings, is largely responsible for the growth of the second economy (an economy based on income from illegal activities) and its eroding effect on the ruble's purchasing power, and on employees' trust in Soviet planning institutions.

The planners' lack of control over the price mechanism is most clearly manifested by budgetary deficits. In this regard, the defense sector plays a crucial role in undermining the price mechanism.

Except for social security deductions and income taxes, the defense sector brings no revenues to the state budget, though it is responsible for consuming at least one third of all revenues collected from the profit-seeking sector and households. Intense military preparations take priority over the development of consumer and technologically advanced industries, which results in shortages of consumer and capital goods. These shortages are much exacerbated by the fact that the defense sector contributes nothing to civilian industries while it competes with civilian enterprises and households for insufficient supplies. There are indications that the current financial crisis is the most severe in the Soviet Union since the end of the World War Two.

It must be assumed that prolonged shortages of goods not only impede economic growth but also compel planners to choose between two undesirable developments--price increases that lead to uncertainties in producers' and consumers' behavior, or poor quality of goods that suppress price increases. Since accepting the first choice further undermines planners' ability to control the economy via the elaborate price mechanism, planners have traditionally settled for the second choice.³ The significant price increases of the early 1980s indicate that either the quality of goods has reached an intolerable level or planners have improved their control over long-term economic trends.⁴

Soviet academic economists have expressed concern that the existing problems with the NEB structure weaken planners' ability to maintain this control.⁵ The lack of information on planning practices makes it difficult to evaluate the extent to which problems with the NEB structure contribute to Soviet economic problems. What complicates such an evaluation is the lack of information on current planning practices. Most Soviet economists have an outdated notion about the NEB which they assume has changed little since the post-war years. While hundreds of economic studies are published in the Soviet Union every year, only a few of them contribute to the advancement of public knowledge on the NEB. As a result, most economists are unable to use the official statistics, whose reading requires understanding of the current NEB structure, as a way to support their analyses of Soviet economic trends. Without this support, their analyses remain speculative exercises whose validity cannot be ascertained.⁶ Few informative works published during the past decade indicate, however, that while planners have improved the NEB structure, they have largely failed to enlighten most of their academic colleagues.⁷

Knowledgeable Soviet economists have succeeded in closing the lacuna between planning practices and the academic thought in the following areas: the integration of material, capital and financial flows within the framework of the Unified Balance; consolidation of public sector and household accounts within the framework of the unified financial balance; the integrated coverage of foreign trade and domestic economic activities; and the development of a well-organized approach to converting the financial and input-output data into the NEB data. It seems that planners' integration of civilian and defense economic activities has remained the last taboo not only for academic economists but also for most planners as well.⁸

This conclusion can be reached by analyzing the hierarchical structure of planning and information gathering in the Soviet Union. While the integration of ministries' reports on the performance of particular production and service sectors into the NEB is the exclusive prerogative of central planners working in numerous state committees, the preparation of unified accounts that contain important state secrets is entrusted only to a small group of experts. These experts can be found in the unified balance sectors of the Central Statistical Administration (TSU), the State Planning Commission (Gosplan), the Military Industrial Commission, the Finance Ministry and other top level planning agencies. Except for these experts and top Soviet party, state and military leaders, no other Soviet officials are aware of the true extent of the economic support for defense effort.⁹

The Central Committee's General department, with the assistance of the Committee of State Security's (KGB) economic unit, makes sure that most planners are exposed only to small parts of Soviet secret preparations for war and that no additional information be given to them for easily deducing the total secret. This preoccupation with secrecy impedes on the efficient work of planning institutions and on the general advancement of economic thought in the country, and should not be underestimated. One begins to understand this effect when one learns about cumbersome estimations performed by central planners when they integrate ministries' financial and output reports into the NEB and using the latter to plan their activities for the next planning period.¹⁰

In reading these reports, it is impossible to establish whether ministries administer the production of civilian or defense goods, the value of their output in purchasers' prices, or what part of their value added was earned from selling particular goods or services.¹¹

In an attempt to close this information gap, central planners require every enterprise to submit special forms, on the basis of which they transform ministries' reports into a format appropriate for the compilation of the NEB. The official statistics mainly aggregate these institutional reports without disclosing the results of planners' analysis of separately submitted special forms. In addition, the official statistical publications exclude most data on production, financial and consumption activities of households. Soviet planners meticulously collect this data, often through channels that lie outside the scope of the official statistics.¹² Major difficulties in compiling the NEB lie in: 1) deriving this data, 2) transforming financial reports into the NEB-type format, and 3) integrating public and household activities. It is not unlikely that planners encounter the same difficulties in their everyday work.¹³

Soviet economic reforms projected for the late 1980s are expected to relieve central planners from directing every production and financial activity of numerous ministries, so that they will be able to focus on the most salient planning issues. It is difficult to see how Soviet planners would succeed in implementing these reforms without requiring ministries to submit reports that are compatible with the NEB structure. The authors of the official statistics either would have to devise a new code to conceal Soviet economic data or further reduce the amount of the openly published NEB data.

A close comparative analysis of annual official statistical manuals published during the past decade indicates that planners have opted for the latter choice in preparing for economic reforms. With the publication of new manuals it becomes more and more difficult to use the official statistics for reconstructing NEB tables with the desired precision.¹⁴ As will be discussed in later sections of this study, the accuracy of some official statistical indicators in areas of wages, subsidies and the structure of inventories also significantly deteriorated during 1982-1983.

1.2 COMPARISON OF SOVIET ACCOUNTING METHODS

The NEB method of accounting is based on three principles: 1) enterprises that maintain independent banking accounts are basic production entities; 2) all enterprises operate in three economic spheres--civilian production, civilian services and defense (production of armaments, defense-related science and the armed forces)--each having a distinct contribution to the economic welfare of society; and 3) the annual economic cycle passes through four stages--production of producer and consumer goods, the interindustry flow, the transfer of value added from civilian production to service and defense sectors, and the end use of goods with resources made available after the final distribution of national income.¹⁵

Following the first principle, planners are able to integrate production and financial activities of particular economic sectors. The second principle is derived from the official Soviet ideology which claims that only civilian production sectors directly contribute to the preparation of the material base of communism which is the ultimate economic objective of the Soviet state. Accordingly, planners believe that only civilian production enterprises generate value added. Services and defense sectors, including armaments production, receive their revenues by means of transfers from civilian production enterprises and their employees. The transfer takes place during the distribution of national income and reduces the amount of resources available to the civilian production sector for end use. The state budget plays a crucial role in this distribution process. All expenses incurred by defense sectors are paid from the state budget.

Following the third principle, planners can optimize the transfer of resources from profit-seeking enterprises and households to the state budget. Profit earned by service sectors is perceived as an additional means of extracting financial resources from households to the state budget.¹⁶ Both profit-seeking and budget-supported services, however, contribute indirectly to the production of material wealth by having a positive impact on labor and capital productivity trends. In contrast, planners believe that defense allocations have a negative impact on the civilian economic growth by depriving the productive sector from good quality capital and labor resources.¹⁷

Given planners' preoccupation with the way each sector contributes to the civilian economic growth, it is not surprising that they divide all economic indicators stored in the NEB tables into production, non-production (services) and defense sectors. Labor and capital stock, wages and revenues of enterprises, consumption and investment, budgetary revenues and outlays, are all divided into these three sectors. This division takes place at all levels of the administrative hierarchy: from the production shop manufacturing both the civilian and defense output to departments of top planning agencies supervising civilian and defense economic activities. Even all types of household outlays are traced to income originally earned by productive, nonproductive and defense labor. This three-way division of economic indicators at all stages of the annual production cycle is what makes the NEB method more useful for the purpose of estimating Soviet military expenditures than popular financial and input-output methods.

Outside the defense sector, central planners lack resources to monitor all subsidiary production activities on an annual basis. When planners compile annual

NEB tables, their major concern is to register the value of output produced for outside suppliers. Even though each enterprise is engaged in the production of output for in-house use, this output is registered as part of the main output. There are some notable exceptions to the rule. For example, all in-house construction, repair and agricultural works are combined with the output of enterprises performing these works. Some products of light, aircraft and other industries are sold by one shop to another at prices that contain profit. These products are registered apart from the main output.¹⁸

All in-house service activities performing outside production processes are also excluded from the value of the main output. These services are usually subsidized with funds drawn from the net profit received by enterprises after selling their production output. Transfers to services which are not subordinated institutionally to production enterprises are treated as part of gross revenues. In effect, these transfers and social security deductions constitute most of the difference between gross and net revenues of public enterprises.¹⁹

As noted above, the official financial accounts are not designed to help their users distinguish between civilian production, nonproduction and defense activities of particular sectors of the economy. Nor are these accounts designed to depict the flow of value added from production and household sectors to budget-supported sectors. In this respect, financial accounts are much more convenient to Soviet officials than the NEB for concealing Soviet economic data. This explains, therefore, why financial accounts are presented in a more organized and complete fashion in the official statistics than the NEB.

However, the usefulness of financial accounts should not be downgraded. A systematic comparison of the NEB and financial accounts makes it possible to trace the work of Soviet planners and to expand the available data base by converting the official financial data into the NEB format. The conversion procedure entails the disaggregation of official data on labor, wages, profit, depreciation and budgetary revenues into production and non-production sectors. It also entails the estimation of transfers from production enterprises and households to services and credit organizations as well as transfers from the state budget to all economic sectors. The balance of transfers indicates the amount of revenues available to each sector, including defense enterprises and households, for end use.²⁰

While the comparison of NEB and financial methods serves the purpose of analyzing the distribution of national income, the comparison of NEB and input-output methods makes it possible to analyze the flow of goods in the Soviet economy. Planners compile detailed input-output tables every five to six years in order to account for all civilian production activities (both main and subsidiary) performed by enterprises. Using these input-output tables, planners can analyze long-term changes in the structure of production, including subsidiary production that eludes their attention during the annual compilation of the NEB tables.

Over the years, planners have developed tools to predict short-term changes in the ratio between subsidiary and main production activities in particular industries. Since 1975 they have begun to use their new tools for compiling abbreviated input-output tables on the annual basis.²¹ Soviet academic

economists have proposed numerous computerized input-output models in the hope that planners would use them to improve the annual planning mechanism. Soviet planners, however, have warned on numerous occasions that they can only use input-output models during the preparatory stages of the plan because these models provide an inadequate framework for integrating material and financial flows.²²

What these warnings indicate is that as long as the NEB method of accounting is used by planners in their everyday work, the major purpose for compiling input-output tables will continue to be the integration of interindustry flows. Apparently the procedure of transforming financial accounts into the input-output format remains too cumbersome and ineffective for planning purposes. Despite its imprecise coverage of subsidiary production activities, the NEB format satisfies all current planning needs, including the integration of material and financial flows inside the framework of the Unified Balance. In addition, all weaknesses connected with the NEB coverage of the structure of production activities can be rectified by using input-output techniques during the preparation of the NEB tables.

Planners compile the NEB data on the output of particular sectors in producers' prices that exclude the turnover tax, subsidies, the delivery cost, trade surcharge and other components of purchasers' prices. Conversion from producers' to purchasers' prices and vice versa is necessary for the efficient balancing of production and end use of particular goods. Input-output tables constructed in both producers' and purchasers' prices are best designed to facilitate the noted conversion procedure. In an attempt not to duplicate their work on NEB tables, planners compile input-output tables only in purchasers' prices. After compiling these tables, planners convert the input-output data on the interindustry flow into a format appropriate for the compilation of the NEB tables in purchasers' prices. Given the fact that the regularly published statistics are extracted from the NEB, it is possible to follow the above planning procedure only for those years during which the input-output data is available. For other years, approximate estimates cannot be avoided.

The authors of the official statistics have published excerpts from detailed input-output tables that planners completed for 1959, 1966 and 1972. More complete versions of these tables were made available to some distinguished academic economists for the study of long-term changes in the production structure. Although the published works of these economists do not reveal any Soviet economic secrets, these works make it possible to reconstruct the first quadrant of input-output tables containing data on the interindustry flow.²³

This data is most useful for the compilation of the GSP (Gross Social Product) balance, particularly dealing with the end use of goods by sector. In effect, this data is the only source of knowledge on the structure of material inputs. However, it must be converted into the NEB format before it can be used for the compilation of the GSP balance. The conversion procedure becomes less complicated when the GSP balance is compiled for 15 to 18 production sectors. As Soviet planners emphasize, the gap between the NEB and input-output data narrows to 1-6 percent on this level of aggregation.²⁴ The input-output data is also useful for deriving some economic indicators that change insignificantly in the long run: the ratio between other earnings and wages of civilian production

employees, the net product of private producers operating in the so-called "other production sectors," transportation and distribution cost, trade surcharges per unit of output, etc.

The above comparison of Soviet accounting methods serves as the groundwork for developing a comprehensive approach to deciphering the official statistics for the purpose of reconstructing the NEB, particularly those sections dealing with military buildup. In effect, the deciphering procedure can be reduced to the problem of converting financial and input-output accounts into the NEB format. Several knowledgeable Soviet economists, such as Volkov and Sverdlik, have suggested that the most promising approach to the study of Soviet economic trends lies in the integration of financial and input-output accounts.²⁵ It has not occurred to these economists that such an integration in reality amounts to the compilation of the NEB--the core of Soviet national accounts. Currently only Belkin and his associates at the Moscow Economic Institute of the USSR Academy of Sciences have succeeded at least in formulating an outline of integrating financial and input-output accounts inside the framework of the Unified Balance.²⁶ The author of the present study is heavily indebted to the above Soviet economists for clarifying most of the issues connected with the NEB coverage of civilian economy.

1.3 THE NEB COVERAGE OF MILITARY EXPENDITURES

While Soviet economists have succeeded in understanding the NEB coverage of the civilian economy, they have failed in understanding the NEB coverage of the military economy. Two factors have apparently caused this failure. First, Soviet economists have been unwilling or unable to reconstruct NEB tables covering the civilian economy. Had they succeeded in the reconstruction process, they would have determined gaps in the official statistics that would have led them to military expenditures. Second, most Soviet economists have been convinced that weapons have always been included in the GSP and national income. There are several indications that planners have been excluding weapons from the GSP and national income at least since 1957.

According to Zalkind (1976), the Gosplan treated weapons as part of the GSP Department III during the Fourth Five-Year Plan of 1946-1950.²⁶ Department I stands for producer goods, including those used in defense production, while Department II stands for consumer goods and reserves. Zalkind, Bor and other Soviet economists have information that, since then, planners began to treat weapons as part of Department I for "practical considerations," a euphemism for concealing the value of produced weapons.²⁷ Even though this information may indeed apply to the early 1950s, it is far from certain that "practical reasons" did not prompt planners to change their concealment practice on the eve of their publication of the first post-war annual statistical manual in 1957. The integration of Department I and III made it indeed impossible to analyze production of weapons, but not their final demand by the armed forces. Planners still had to treat weapons as a separate component of national income. The acceleration of the arms race certainly made it more and more difficult to conceal weapons in published national income accounts. An additional concern to planners was the

compilation of the detailed input-output table for 1959, which threatened to expose their military secrets.

The year 1957 was eventful in the history of Soviet statistics for several reasons. In addition to publishing the statistical manual, planners presented a revised version of the NEB to leading Soviet economists at the All-Union conference of statisticians. It seems most probable that planners had to devise their secret code for concealing military expenditures before presenting their new version of the NEB. It also may not be a coincidence that between 1956 and 1957 the sum of civilian and military working capital included in the investment component of national income declined without any apparent reason from 13.6 to 9.2 billion rubles or by 30 percent. If one assumes that planners began to exclude weapons from national income, then the observed decline can be explained by the fact that weapons exceed material outlays of defense industry by the sum of wages and social security deductions.

The 1957 conference generated lively debates among Soviet economists. Such prominent planners as Sobol', Strumilin, Turetskiy and Bor commented extensively not only on civilian but also military economic issues. The famous debate between Strumilin and academician Trakhtenberg on the GSP division into Departments I, II and III has been publicized in both Soviet and Western literature.²⁸ This debate is noteworthy because it pitted new planning ideas defended by Strumilin against outdated ideas of the early 1950s defended by the Soviet academic thought. The implications of Strumilin's arguments were clear: since the GSP consists of Departments I and II and since weapons are in Department III, planners must exclude weapons from the GSP altogether to preserve the logic of Soviet national accounts.²⁹ Trakhtenberg's position, though poorly defended on Marxist theoretical grounds, indirectly echoed arguments about "practical considerations" that prompted planners to conceal weapons inside Department I in the early 1950s.

It is clear that Trakhtenberg's position cannot be defended theoretically because weapons are neither producer nor consumer goods. But what really undermines his position is that it is much less practical than Strumilin's if one approaches their debate as a matter of strictly "practical considerations". By completely removing Department III from the GSP, planners could effectively close the gap in national accounts by the entire value added component of the defense production sector. How much more could planners ask for in their attempt to conceal the extent of Soviet military preparations without distorting the ratio between Department I and II?

Planners never publicized how they resolved the outcome of the Strumilin-Trakhtenberg debate. Furthermore, during the 1960s the military issue began to disappear from the openly published literature as academic economists were discouraged from exploring it with the same intensity as before. The conclusion to be drawn from open publications released during the 1960s and 1970s is that academic economists were led to believe that planners made no significant changes in their accounting practices in the military area. Michael Checinski, a former Polish planner, told Professor Wiles quite a different story: it was "at the turn of the year 1958/9 [when] a friend, who was a high Polish officer, went to Moscow to be told about a great revision of military accountancy."³⁰

What exact revision took place can be determined by analyzing official statistical data for the 1950s, which may not be even sufficient for drawing definitive conclusions. It also can be determined by analyzing gaps in the official statistics during 1965-1984. In the process of analyzing these gaps one reaches the conclusion that planners began to exclude the value of armaments from the GSP and national income altogether. As analyzed in Section 11, the official statistics contain the following gaps:

1. Demographic gap--total labor force exceeds the sum of the official labor force, the unemployed and the armed forces by 4-5 million persons.
2. Capital gap--fixed capital of the administration sector comprises only 30 percent of total fixed capital of other non-productive sectors.
3. Wage gap--total wages and other earnings exceed those received by the official labor force and the armed forces by 6 percent.
4. Gap in social security revenues--total revenues of the state social security budget exceed those received from all civilian sectors, the armed forces and households by 1-1.5 billion rubles.
5. Depreciation gap--total depreciation in other service sectors exceeds capital depreciation in budgetary T&C and administration sectors by 50-60 percent.
6. Investment gap--the difference between total investment and total additions to stocks of fixed capital, inventories, reserves and defense construction increased from 10 to 30 billion rubles during the past two decades. This gap, however, still remains unrealistically small to contain the value of produced weapons; and there is no other place in Soviet national accounts where weapons can be hidden. In addition, the structure of the investment gap includes the output of sectors which do not manufacture military goods.

The above gaps lead one to believe that the defense labor and capital are not engaged in the production of the GSP and national income similarly to labor and capital of service sectors. It thus appears that the investment gap represents material inputs into defense production rather than the value of produced weapons. Wages and social security deductions of defense production enterprises are excluded from value added of sectors producing the GSP and national income similarly to value added of service sectors. Nevertheless, the total value of produced weapons can still be estimated as the sum of material, depreciation and labor (both wages and social security deductions) outlays. Total military expenditures also include operational expenditures of the armed forces, defense construction, defense R&D, military pensions and stipends, and some other indirect expenditures connected with various services provided to the armed forces.

The NEB-based method of estimating military expenditures differs considerably from the method by proposed Western researchers who, like Soviet

academic economists, believe that the GSP contains the actual value of armaments procured by the armed forces.³¹ Consequently, these researchers underestimate the value of Soviet defense production output at least by the amount of wages and social security deductions. In addition, they usually assume that defense production enterprises earn profit. If they are incorrect, then the Soviet defense burden must be further increased by the amount of net investment into the defense production sector and services performed for this sector's employees that would be otherwise financed from profit.

It can be suggested that, contrary to the popular belief in the West, Soviet production shops engaged in manufacturing armaments do not earn profit because they are budget-supported. Profit, however, is included in prices of capital goods produced by or sold to these production units. When Western intelligence communities obtain covert reports on prices of Soviet armaments and discover that these prices contain profit, they automatically assume that this profit was earned in the process of armaments production. As one can gather from the openly published statements of US intelligence officials, their critical assumption is based in part on one Soviet source, according to which defense enterprises began to earn profit in the aftermath of the 1967 price reform.³²

One can propose a different reading of this Soviet source. It is known that defense production enterprises often prefer not to rely on outside suppliers and themselves produce many components for their finished military-related products. Since these components also can be used for civilian purposes, their production does not require budgetary support. Shops of defense production enterprises producing these components earn profit, though at a much smaller rate than shops producing household appliances and other consumer durables at the same enterprises. Brezhnev himself made no secret of the fact that the defense sector is heavily engaged in the production of consumer durables.³³ Defense enterprises apparently reap large profits from meeting some of the unsatisfied consumer demand. These profits in part cover the enormous cost of armaments production. Forcing defense enterprises to pay for some of the defense burden could have been the aspect of price reforms mentioned in the above Soviet source.

The fact that financial reports of defense production enterprises show profit while their main output is financed by the state budget is one of the paradoxes of Soviet national accounts. According to Soviet accounting principles, profits earned from different activities are entered on the same banking accounts maintained by enterprises. In the process of compiling the NEB, planners regularly ask enterprises to submit special forms in which they learn how some shops earn profit for producing capital that is used as inputs by defense production shops at the same enterprises. These forms also specify the amount of labor and capital engaged in the production of civilian and defense goods. Planners must keep these complicated accounting procedures in order to distinguish civilian from defense activities at the same enterprises and thus to monitor closely the effect of the precisely estimated defense burden on the civilian economy.

Soviet planners make much effort to provide the best possible economic support to the defense economy with the least financial cost to the society. The defense economy buys cheap but best quality capital that is in short supply, attracts the best experts and workers with high qualifications, creates an efficient

bonus system that promotes technological innovation and the reduction of waste in the use of resources, and allows the military representatives to check the end product inside production plants. The absence of profit, the inadequate supply of consumer goods and services to the armed forces, and the low salary received by draftees all reduce the financial cost of the defense program. In addition, the defense sector is engaged in producing consumer goods for which it receives large profits that partially pay for its activities.

All these factors certainly make the defense sector the most efficient in the Soviet economy. At issue, however, is whether it is as cost effective as planners hope it to be and whether artificial conditions created for the defense economy conceal the actual cost of the Soviet defense effort. Some Western observers claim that by manipulating prices Soviet planners only fool themselves by failing to estimate the true cost of weapons systems which must be much larger than they are willing to admit.

It appears that critics of Soviet planners' confuse the financial cost with the social cost of the defense burden. The amount of Soviet military expenditures entered in planners' balance tables equals the actual financial cost of the defense burden, including the cost of all defense-related capital outlays, military pensions and stipends. The fact that planners found the way to reduce this cost compared to their Western counterparts does not justify the artificial increase of this cost by the amount of profit and money saved from lowering the price of capital goods delivered to the defense sector. Soviet prices serve the purpose of transferring resources from households to the defense sector, among other purposes. The abandonment of the existing two-level price system would make it impossible for Soviet planners to both produce and finance the defense machine with the intensity needed to meet current doctrinal requirements. In addition, it would cause such a severe financial crisis that the very existence of the Soviet economic system would become threatened.

The fact that Soviet planners are able to manipulate prices, thus averting a financial catastrophe, does not necessarily indicate that they are able to lower the social cost of the defense burden. Despite the skill of Soviet planners and the probable efficiency of the defense production sector, this burden still may be larger than the financial cost due to 1) the total isolation of the defense sector, 2) the imbalance between demand and supply and 3) the low unemployment level and severe shortages of skilled labor. Any positive contribution of the defense sector to the civilian economy that can be found in Western societies is thus absent in the Soviet society.

The absence of the so-called "ripple effect" from defense programs much simplifies the task of measuring the impact of these programs on the civilian economic growth and population's standard of living. However, one still must demonstrate the precise degree to which the social cost of the defense burden outstrips its financial cost. Certainly, Soviet planners must have a sophisticated computerized model to measure this social cost with the required precision.³⁴ It is ironic that while some Western observers criticize Soviet planners for underestimating military expenditures, others fail to notice the noted discrepancy between the social and financial cost and unjustifiably conclude that there is little

correlation between a high growth of Soviet military expenditures and lagging civilian economic growth.³⁶

1.4 COMPARISON OF SOVIET AND GNP ACCOUNTS

The usefulness of Soviet national accounts is often discarded because of their format, which appears alien to Western economists who are only familiar with GNP-type accounts. The issue as to whether Soviet or GNP accounts are more valid cannot be reconciled by means of economic analysis because they are based on antagonistic philosophical outlooks. Soviet planners trace all value added to labor inputs in civilian production sectors. In contrast, Western economists trace it to all factors of production, including capital, operating in civilian production, service and defense sectors. While planners optimize production activities with respect to attaining certain societal objectives, Western economists view profit as the major motivating factor for individuals to employ capital.

On a social level, planners are justified to decide what economic sectors produce value added as long as they optimize production and distribution of value added with respect to their social objectives. Given the perennial nature of the Soviet military drive and the importance attached to the development of services, the planners' single economic objective of preparing a material-technological base of communism seems illogical, if not hypocritical. Consequently, one must conclude that service and defense sectors themselves generate value added rather than receive their income from civilian production sectors during the distribution of national income. The GSP and national income must be then increased by the amount of value added that is generated by service and defense sectors.

The GSP exceeds the end product by the amount of the intermediate product (the interindustry flow), which is excluded from the GNP. Soviet economists emphasize that the aggregate measurement of annual economic activities must encompass all stages of the production process rather than the final stage. While the analysis of the interindustry flow is an essential feature of the Soviet planning process, Western economists are primarily interested in the end product as a measure of productivity. For the purpose of comparing the productivity of Soviet and Western economies, it is necessary to reduce the GSP by the amount of the intermediate product.

While the Soviet end product includes planned losses, the Western end product includes indirect business taxes. Although planned losses reduce the value of goods available for end use, they occur beyond producers' control and ability to generate value added. Similar to indirect business taxes, planned losses must be included in the Soviet GNP but excluded from national income.

In this author's opinion, the problem of comparing foreign trade revenues cannot be resolved unconditionally because the Soviet policy of state monopoly leads to high taxes on imported consumer goods and to subsidies on some exported as well as imported goods. From the financial perspective, the Soviet GNP must include the balance of budgetary revenues and outlays from all foreign trade activities. If one is to assume that the GNP measures the capacity to produce goods and services, then foreign trade revenues must be estimated as surplus

foreign trade revenues (net export), thus excluding the balance of imports and exports in domestic rubles. These two measurements are needed in order to obviate the problem arising from comparing world and contract CEMA (Council of Mutual Economic Assistance) prices with Soviet domestic prices.³⁶

The issue as to whether the Soviet GNP must include profit that is not earned by defense production enterprises can be resolved by analyzing the process of profit distribution. Profits are distributed in the Soviet economy in the following way: bonus wages, all types of capital investment, transfers to household services and research organizations, financing of working assets, and payments to budgetary and credit institutions. Since Soviet defense production enterprises are budget-supported, their payments are limited to social security deductions and unspent funds appropriated during previous fiscal years. Bonus wages, housing and other services are added automatically to regular wages of defense sector employees for attaining planning objectives. Financing of the defense-related research, capital investment and working assets is implemented through separate budgetary channels. One can conclude, therefore, that the problem of adding profit to the price tag on defense goods amounts to the estimation of the entire financial cost of the defense burden as opposed to its current financial cost.

The major methodological problem concerns the conversion of Soviet official (established) prices to Western-type market prices. The idea behind this conversion procedure is that market prices are closer to the true value of goods than official prices. When CIA analysts perform this conversion procedure they use Bergson's adjusted factor-cost standard (AFCS), which supposedly avoids the problem of overestimating consumer goods and underestimating capital goods. Thus, CIA analysts remove the turnover tax, add subsidies, and replace profits with a capital charge to estimate the structure of the Soviet GNP by end use. Following Bergson and Becker, CIA analysts believe that the turnover tax does not "represent a surrogate factor charge to compensate for other problems in Soviet prices."³⁷

Western economists' approach to official prices differs considerably from that of Soviet planners who believe that average wages rather than the value of fixed capital stock and inventories provide a standard of measurement. For example, they only use average wages to estimate what portion of the turnover tax and the net profit registered as part of the industrial GVO was actually earned by agricultural employees. Their estimates supposedly indicate the true net agricultural output as opposed to its official interpretation. Industries engaged in processing agricultural raw materials receive high profits in part because they purchase these materials at prices below a "socially necessary" level. Hypothetically, planners can follow the same procedure for measuring the extent to which prices on all consumer and producer goods diverge from their "socially necessary" level.

If planners have found the way to compare official and "real" prices, then they can establish theoretical limits for raising prices on consumer goods to counterbalance the decline of prices on capital goods. Planners cannot indefinitely lower prices on capital goods without pushing prices on consumer goods beyond the reach of the average Soviet household. As long as prices remain within the established theoretical limits, planners can change price levels in accord with

current production and financial needs. Even though planners realize that low prices on capital goods lead to the enormous waste in the use of resources, they need these low prices to create favorable financial conditions for the development of key heavy and defense industries.

High profits earned by consumer industries alone cannot compensate for the low level of prices on capital goods. The turnover tax contained in prices on domestically produced and imported goods also compensates for the price imbalance. Soviet authors usually associate this compensation with subsidies on agricultural goods, housing subsidies and financing of other social programs.³⁸ In addition, it must be emphasized that the turnover tax also helps to finance defense programs and some exports sold to other countries below the production cost.

This author agrees with Soviet economists on the issue of the turnover tax. The latter must be disaggregated into sectors like profits rather than excluded from the calculation procedure altogether. The issue as to what standard of measurement should be used for deriving real value--wages or capital charge--must ultimately depend on the researcher's ideological position. The debate between Marxists and neo-Ricardians on the validity of the labor theory of value has been rekindled during past years.³⁹ It should not be dismissed as irrelevant by any economist who challenges the validity of Soviet planning methods, particularly in the area of the state price policy.

1.5 HIDDEN INFLATION AND THE QUALITY OF GOODS

All estimates presented in this study in constant prices are based on price indexes compiled by planners for official statistical purposes. The extent to which official price indexes distort real price trends is unknown. There is no evidence that planners rely on data that is more precise than that used by the authors of the official statistics to estimate growth rates, GVO in constant prices, growth of the produced national income, capital investment in constant prices, retail trade index and other planning indicators.⁴⁰ It seems that even if all data became accessible to Western researchers, the problem of inflation would still be open to competing interpretations since one can design different, equally valid methods, for measuring price changes in the centralized economy. Each method would lead to varying results depending on the selection of a particular base year and parameters of compatible products chosen for comparison.⁴¹

Soviet authors complain that official price indexes are designed to be "insensitive" when the quality of goods decreases and "too sensitive" when the quality of goods increases. If these indexes were designed to capture real changes in the quality of goods, then Soviet planners would be unable to contain inflation in two instances: 1) when the production cost increases while the quality of goods selected for comparison changes insignificantly; and 2) when the production cost changes little while the quality of goods deteriorates.

In reality, when the quality of goods decreases but their production cost remains the same, enterprises sometimes avoid placing them in a category of less technologically advanced goods. Similarly, when the production cost increases enterprises often blame it on the introduction of new products whose prices cannot

be compared to old prices which are chosen at that time for the compilation of price indexes. In both cases, inflation remains hidden but the Soviet society pays a high price in terms of poor technological innovation, the enormous waste of resources and the inferior quality of goods. Certainly, if changes in quality had an undistorted effect on prices, then inflation would become much more visible. But how can one create a uniform measure for quality in Soviet-type economies? Unless a definitive answer to this question is found, one must operate with official price indexes and hope that the distortive effect of inflation itself changes insignificantly in the short-run.

The absence of data on the quality of Soviet goods also makes it difficult to estimate real changes in Soviet economic efficiency. Certain assumptions therefore cannot be avoided. In this study, the quality of Soviet capital goods will be measured with the output-capital ratio, the quality of consumer goods measured with the ratio between trade inventories and the trade turnover, the quality of services measured with the ratio between material and labor outlays, and the quality of defense goods measured with the ratio between labor and material outlays. This approach to the problem with quality is based on the following observations: the purpose of capital investment is to increase value added; when consumer goods are in short supply the growth of inventories signifies either unjustified price increases or decreases in the quality of goods; in a society where service sectors are underdeveloped and where materials and equipment are in short supply the quality becomes a function of satisfied demand for basic necessities; the reverse situation to that existing in services can be observed in the defense sector where efficiency is measured by the amount of conserved resources. A more precise approach to estimating the efficiency of the defense production sector can be based on the comparison of physical output and its per unit cost.

1.6 THE RELIABILITY OF SOVIET NATIONAL ACCOUNTS AND THE SECOND ECONOMY

The official statistics and secondary Soviet sources provide most information for reconstructing the NEB. In cases where the available information is insufficient, it is possible to derive missing data by solving a system of equations or by approximations. Although approximate estimations are always based on certain assumptions, enough indirect evidence is available to substantiate these assumptions thoroughly. In some cases it is possible to test approximate estimates by employing several estimation procedures, each based on a particular segment of Soviet national accounts.

The findings which conclude each chapter of this study are preliminary, requiring further investigation, and should not be accepted as unconditional facts. Despite this fact, the reader is invited to follow closely every calculation step, to double check major findings and to question the exact meaning of Soviet planning indicators. As evident from the tables presented in the end of each chapter, most derived pieces of data are interconnected and hence vulnerable to few conceptual and estimation errors. Further testing of the derived results must ascertain the total margin of error for Soviet military expenditures and for their impact on the economic growth.

Such testing would ascertain the internal consistency of Soviet national accounts but not their validity as best measurements of real Soviet economic trends. Many Western observers reject Soviet national accounts because they believe that planners ignore growing illegal economic activities. These observers argue that since illegal trade activities are enormous in scope and since planners simply cannot cope with their growth, the official statistics provide a distorted view of Soviet economic trends. Although recent emigres assert that as much as 30 percent of Soviet adults are now engaged in some sort of illegal activities, no definitive conclusion can be drawn from their reports as to the real size of this "second" economy. Many emigres belonged to a certain strata of the Soviet society that had more opportunities to engage in illegal activities than the average Soviet citizen. Thus, any statistical study based on their personal experience would be quite biased.⁴²

In an attempt to understand the way planners might cope with illegal activities, the author of this study conducted a number of private interviews with former Soviet officials who have some familiarity with Soviet accounting procedures. On the basis of these interviews and Soviet analyses of household financial activities this author made the following conclusions:

1. Planners have means to collect information on all production activities in the public sector and on all legal production activities in the private sector.
2. All stolen state property is registered as production losses, material inputs to the end products or as the liquidated capital. In this way, planners can always balance the production and end use of goods. Most goods, however, are not stolen but resold to other households at prices that are much higher than state retail prices. This form of scalping on scarce commodities is never registered in national accounts of any country. Often scarce commodities are not sold but are exchanged for other scarcities, including good quality services.
3. The original source of all monetary income received by households is the State Bank. In this way, planners can monitor all additions to unorganized household savings--money kept outside state control.
4. The value of smuggled and illegally produced goods is insignificant compared to the value of legally produced goods, with the exception of illegal alcohol production.
5. Illegally traded goods and services do not increase the value of the annual product nor the total monetary income of households. Such trade activities only result in the transfer of monetary income from one household sector to another.
6. The amount of people illegally holding several jobs is too small to effect planners' estimations of the unemployed. Planners also have means to estimate the number of persons employed part time in the public sector.

7. The volume of private services rendered in such areas as health, education and legal advice is still too insignificant compared to the volume of services rendered by the state.

What these conclusions indicate is that planners may underestimate national income by the amount of stolen goods registered as production losses or as material inputs as well as by the amount of illegally produced alcoholic beverages. Using the NEB data, the size of this alcohol production can be derived by analyzing trends in household purchases of sugar and other ingredients from which alcohol is made. Planners can compare these purchases with the "normal" consumption level of sugar per capita to determine first the size of material inputs and then the actual output. By Western standards, planners underestimate national product by the amount of revenues received by illegal alcohol production. Planners, however, consider these revenues as the monetary transfer within the household sector.⁴³

END NOTES

¹ See Appendix A on the outline of the Soviet decision making process for drafting and approval of the State Plan, including the defense sector. Also refer to F. Kotov, *Organizatsiya Planirovaniya Narodnogo Khozyaistva SSR*, (Moscow: Ekonomika, 1974).

² V. Belkin, and V. Ivanter. *Planovaya Sbalansirovannost'* (Moscow: Ekonomika, 1983), pp. 33 - 49, succinctly summarize the NEB role in improving the work of Soviet planners.

³ In reality, Soviet planners avoid making this choice themselves and force it on enterprises which pledge to fulfill production plans with insufficient supplies. Given the constant shortage of high quality goods, it is indeed surprising to read in Soviet newspapers how particular sectors of the economy fulfill plans above set goals. As former Soviet economists observe, the original planning goals are usually much higher than those revealed by the end of the planning period. It thus appears that the manipulation of data takes place with respect to planning objectives but not with respect to the actual production output.

⁴ The analysis of economic and institutional factors that shape Soviet price policies is beyond the scope of this study. The price reforms of 1982 are briefly discussed in N. Glushkov, and A. Deryabin, eds., *Tsena v Khozyaistvennom Mekhanizme* (Moscow: Nauka, 1983), pp. 152 - 196. For an excellent discussion of wholesale prices refer to L. Kantor, ed., *Teoriya i Metodologiya Planovogo Tsenoobrazovaniya* (Moscow: Mysl', 1976); and for retail prices refer to A. Deryabin, *Ekonomicheskie Osnovy Sistemy Roznichnykh Tsen* (Moscow: Nauka, 1980).

⁵ A. Yemel'yanov, ed., *Sistema Balansov v Narodnokhozyaistvennom Planirovanii* (Kiev: Naukova Dumka, 1984), pp. 16 - 18.

⁶ Soviet economists display a lack of knowledge about most important aspects of the Soviet economy, including the supply and end use of particular goods, capital works in current prices, consumption and investment trends in private and public sectors, the role of foreign trade, budgetary deficits and a number of other economic indicators. It is incomprehensible that economists can perform even the most simple analysis of Soviet economic trends with the type of data base that is available to them. In view of the above, one begins to wonder whether the role of the official statistics is limited more to propagandistic rather than educational purposes.

⁷ Some knowledgeable Soviet economists openly admit that their works as introductory texts on particular aspects of Soviet economic planning that are unfamiliar to most Soviet economists. For example, economists working outside planning agencies apparently learned for the first time about details of planning foreign trade from A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov* (Moscow: Finansy, 1976) and V. Belkin, and A. Geronimus eds., *Model' Dokhodov i Balans Narodnogo Khozyaistva* (Moscow: Nauka, 1978), about consolidated financial accounts from Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*

(Novosibirsk: Nauka, 1981), about the Unified Balance from Belkin and Geronimus (1978), about depreciation from V. Senchagov et al., *Amortizatsionnyi Fond V Usloviyakh Intensifikatsii Proizvodstva* (Moscow: Finansy, 1975), about agricultural finances from V. Semenov, *Finansovo-Kreditnyi Mekhanizm v Razviti Sel'skogo Khozyaistva* (Moscow: Finansy i Statistika, 1983), and about retail trade from A. Volkov, "Fond Lichnogo Potrebleniya v Staticheskoy Mezhotraslevom Balanse Obshchestvennogo Produkta." *Ekonomika i Matematicheskie Metody*, No. 5, 1968, and P. Lokshin, *Spros Proizvodstvo Torgovlya* (Moscow: Ekonomika, 1975).

⁸ The two most informative studies on military economy to appear during the last decade were A. Pozharov, *Ekonomicheskie Osnovy Oboronnogo Mogushchestva Sotsialisticheskogo Gosudarstva* (Moscow: Voenizdat, 1981), pp. 129 - 132, and A. Zalkind, ed., *Dva Podrazdeleniya Obshchestvennogo Produkta* (Moscow: Statistika, 1976), pp. 23 - 25. These authors however, did not proceed beyond the traditional Marxist division of annual production into producer and consumer goods.

⁹ See Appendix B on the pervasive secrecy surrounding Soviet planning of defense activities.

¹⁰ For a brief discussion these estimates refer to Belkin and Geronimus, pp. 105 - 139, and Volkov, pp. 75 - 96.

¹¹ It is for this reason that these reports are used by economists working within a particular sector rather than by economists specializing in national economic planning.

¹² For example, official statistical publications never contain information on consumption and investment trends in the private production sector, on household purchases of goods and services, total household saving activities, etc.

¹³ As Belkin and Geronimus, pp. 113 - 115, emphasize, current accounting procedures make it extremely difficult for planners to keep track of financial activities of particular production sectors rather than ministries. During the compilation of the State Plan they transform the financial data into the NEB data only on the level of the entire industrial sector. The above authors suggest that reforms in accounting procedures would facilitate planning of value added by sector. These authors, however, fail to mention how such reforms would undermine the TSU secret code designed to conceal real Soviet economic trends.

¹⁴ Well known of the shrinking data base include the omission of data on consumption and investment components of national income (since 1976), on employees of particular industrial sectors (since 1976), on the structure of inventories (since 1981), and on national of trade and distribution sectors (since 1980).

¹⁵ For an excellent presentation of the basics of the NEB method refer to M. Bor, (ed), *Planovyi Balans Narodnogo Khozyaistva* (Moscow: Ekonomika, 1977) and E. Freidmunt and M. Eydel'man, *Ekonomicheskaya Statistika* (Moscow: Statistika, 1976).

¹⁶ Many Soviet economists would disagree with this conclusion. However, they never pay attention to the fact that data on profit earned by particular service sectors has never been made available to them. The derived data indicates that household services earn disproportionately higher profits than corresponding production services. For planners' preoccupation with extracting household revenues for reinforcing ruble's purchasing power, refer to memoirs of the Soviet financial minister Zverev reported in P. Belousov, *Istoricheskiy Opyt Planovogo Upravleniya Ekonomikoy SSSR* (Moscow: Mysl', 1983), pp. 172 - 173.

¹⁷ This observation is based on comments frequently encountered in Soviet literature that military expenditures are wasted allocations that continuously fall out from the annual reproduction cycle. See A. Pozharov, (1981), p. 132.

¹⁸ For the detailed description of accounting procedures in this area refer to the informative article by L. Gol'denberg, a senior TSU official, "Yedinovremennoe Obsledovanie Zatrata na Proizvodstvo Produktov na Promyshlennyykh Predpriyatiyakh", *Vestnik Statistiki*, No. 12, 1977.

¹⁹ A more complex relationship between gross and net revenues can be observed in construction and agricultural sectors. This relationship is discussed in detail in Section 5, which is based on the analysis presented in Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya* (Moscow: Ekonomika, 1969 and 1980) and L. Bass, "Razrabotka Pokazateley Chistoy Produktivnosti v Otchetnom Mezhotraslevom Balanse", *Vestnik Statistiki*, No. 3, 1980.

²⁰ Distribution of national income is discussed in detail in Bor, pp. 131 - 141 and in Sverdlik, pp. 123 - 129.

²¹ For an excellent discussion of the abbreviated input-output table refer to L. Gol'denberg "Voprosy Razrabotki Mezhotraslevykh Svyazey v Promyshlennosti", *Vestnik Statistiki*, No. 12, 1980.

²² A. Dorovskikh, "Nekotorye Voprosy Metodologii Ekonomicheskogo Analiza v Narodnokhozyaistvennom Planirovanii", *Planovoe Khozyaistvo*, No. 8, 1975.

²³ See U. S. Department of Commerce, *Input-Output Structure of the Soviet Economy: 1972*, by D. Gallik, B. Kostinsky, and V. Treml, Foreign Economic Report, No. 18, (Washington, D.C.: Government Printing Office, 1983), on the 1972 input-output table. Also see D. Gallik, M. Heinsemeier, B. Kostinsky, V. Treml and A. Tretyakova, *Construction of a 1977 Soviet Input-Output Table*, (Washington, D.C.: U.S. Department of Commerce, 1983), on the 1977 table. These authors chose the year 1977 in hope that Soviet officials would release the detailed data for that year. Since it is doubtful that Soviet officials will ever again publish input-output data, the above authors cannot avoid reconstructing major portions of the NEB in accomplishing their task. Their work will be discussed in particular sections of this study.

²⁴ Quoted in Gol'denberg, (1980), p. 28.

²⁵ See Volkov, pp. 76 - 80, and Sverdlik, pp. 38 - 49.

²⁶ Zalkind, p. 24.

²⁷ Zalkind, p. 24, and M. Bor, *Effektivnost' Obshchestvennogo Proizvodstva i Problemy Optimal'nogo Planirovaniya* (Moscow: Mysl', 1972), p. 72.

²⁸ P. Sokolov, ed., *Politicheskaya Ekonomiya: Pervaya Faza Sotsialisticheskogo Spособa Proizvodstva*, (Moscow: Voenizdat, 1974), p. 968, and P. Wiles, "Soviet Military Expenditures: Where the Skeletons Lie Buried", (A paper delivered at III World Congress for Soviet and East European Studies, Washington, D.C., 1985), p.48. Wiles quotes S. Strumilin's article that appeared in *Voprosy Ekonomiki*, No. 7 1959. Strumilin also expressed the view of Gosplan referrals in his 1957 collection of essays. The essay on the NEB was reprinted in S. Strumilin, *Statistika i Ekonomika* (Moscow: Nauka, 1979), pp. 96 - 118. His view on defense economy is given on p. 103. There is no reference to the publication of Trakhtenberg's view in the Soviet literature.

²⁹ In his review of Soviet literature, Wiles expressed the view that Trakhtenberg's position is dominant among Soviet economists. However, most Soviet economists agree in principal with Strumilin's theoretical arguments, but defend Trakhtenberg's position on practical grounds which prohibit the creation of a separate Department III. The imagination of most Soviet economists is quite limited as they cannot accept the possibility that planners exclude Department III from the GSP altogether. The alternative suggestion may be that censors prohibit the revelation of truth in the openly published literature. Detailed references to the discussion of the military issue in Soviet literature are presented in Zalkind, p. 23.

³⁰ Wiles, p. 10.

³¹ See Section 11 for the discussion of Western methods of estimating Soviet military expenditures.

³² See D. Burton, "Estimating Soviet Defense Spending" *Problems of Communism*, March-April 1983, p. 87, who cites Sokolov, p. 287, to the effect that "the provision in the 1967 price reform that put military products on the same pricing basis as civilian goods. The importance of this information was the revelation that "military production had in effect been subsidized." Nothing in the cited provision clearly states that defense production was no longer subsidized. One could as well interpret this provision as implying that manufacturing of capital goods by defense production enterprises was no longer subsidized. What is more likely, however, is that this provision refers to profit-seeking enterprises functioning under the aegis of the USSR Defense Ministry. These, rather than defense production enterprise subordinated to the Military-Industrial Commission (VPK), are mentioned in the Soviet literature. For example, refer to M. Shermenev, ed., *Gosudarstvennyi Byudjet SSSR* (Moscow: Finansy, 1978), p. 313.

³³ U. S. Congress, Joint Economic Committee, *Allocation of Resources in the Soviet Union and China - 1981*, 97th Congress, 1st Session, Part 7, 1982, pp. 133 -134.

³⁴ Pozharov, pp. 132 - 136, hinted about the existence of this model and its major parameters.

³⁵ In U. S. Congress, Joint Economic Committee, *Soviet Economy in the 1980's: Problems and Prospects, Parts I and II*, 97th Congress, 2nd Session, 1982, p. 294, Becker agreed with Rush and the authors of the SOVMOD model who find no correlation between defense spending and economic growth. These researchers went as far as to suggest that this fact was well perceived by Soviet leaders during the heyday of detente. Soviet leaders supposedly thought it would be unproductive to cut defense spending for the purpose of promoting economic growth. The analysis of Soviet defense burden presented in this study leads to a conclusion which is opposite of that advanced by Becker and Rush.

³⁶ In an attempt to optimize the profitability of foreign trade operations, planners maximize the retail sale price of imported consumer goods and minimize the producer price of exports. In this way, Soviet exports can compete with foreign made goods and their sales can bring needed foreign currency for purchasing imports that in large part cover budgetary deficits of domestic currency. It thus appears that the financial method would lead to the overestimation of the Soviet GNP, while the production method would lead to its underestimation. The solution of combining the two methods requires a special inquiry into Soviet export and import policies. Although such an inquiry can be completed with the NEB data base, it is outside the scope of this study.

³⁷ U. S. Congress, Joint Economic Committee, *U.S.S.R.: Measures of Economic Growth and Development, 1950-80*, 97th Congress, 2nd Session, 1982, p. 35.

³⁸ T. Ryabushkin, *Teoriya i Metody Ekonomicheskoi Statistiki*, (Moscow Nauka, 1977), p. 422.

³⁹ For the analysis of these debates refer to E. Mandel, and A. Freeman, *Ricardo, Marx and Sraffa* (Thetford, Norfolk GB: The Thetford Press, 1984).

⁴⁰ Some former Soviet economists, who emigrated to the West, claim that planners are not interested in estimating more precise indexes for ideological purposes.

⁴¹ The fact that the authors of the official statistics manipulate data to advertise high growth rates can be easily ascertained by comparing price levels in 1970 (the official base year) with other years chosen for comparison. In contrast, planners selected 1973 as a base year to account for significant price changes during 1972-1973.

⁴² See G. Grossman, "The Second Economy of the USSR", *Problems of Communism*, (September - October, 1977), and G. Schroeder, and R. Greenslade, "On the Measurement of the Soviet Economy in the USSR", *ACES Bulletin*, (Spring 1979); for the opposite Western views of the second economy. It is unclear how the problem of statistical bias can be ever resolved in a satisfactory way.

⁴³ This conclusion can be reached after studying Soviet accounting methods that are used to measure the value of national income generated in the private

production sector. For example, see Gosplan (1974 and 1980) sections devoted to household activities.

2.0 THE UNIFIED BALANCE OF THE SOVIET ECONOMY

2.1 THE STRUCTURE OF SOVIET NATIONAL ACCOUNTS

2.1.1 Three Echelons of National Accounts

Soviet national accounts can be divided into three echelons: higher, middle and lower. The higher echelon is represented by unified accounts or what planners call "the Unified Balance of the Soviet economy." This Unified Balance integrates material and financial flows as well as data on current economic activities and the available labor, capital and financial resources. The middle echelon consists of particular segments of the Unified Balance that deal with the flow of goods, distribution of national income, budgetary and credit flows, household budgets, foreign trade activities, financing of capital investment and working capital, changes in the stocks of fixed capital, inventories and reserves, as well as demographic and labor force trends. The lower echelon accounts deal in detail with particular production, financial and other activities of all sectors in all regions of the country.

The present study deals only with the higher and middle echelons of Soviet national accounts. This limits the scope of inquiry to the most important economic indicators compiled for ten industrial sectors, agriculture, construction, transportation and communication, trade and other distribution sectors, so-called "other production sectors," nine service sectors, and to defense production, defense-related science and the armed forces. No attempt is made here to derive information on particular MB (Machine Building) sectors producing civilian and defense goods. A separate study is required to convert financial reports of MB ministries into the NEB format. An additional effort must be made to convert the official data on the output of particular MB sectors from constant to current prices.

2.1.2 The Unified Balance of the Soviet Economy

The Unified Balance consists of nine interconnected sections consisting of rows and columns. Each row and column represents an economic sector or a particular economic indicator. Data is stored at the intersection of rows and columns. The first four sections have the same function as four quadrants of the standard Soviet input-output table: 1 - the interindustry flow; 2 - the end product; 3 - value added generated by civilian production sectors and 4 - value added of service and defense sectors. Additional sections contain data on financial flows of households, services, budgetary and credit sectors: 5 - the empty section of the balance; 6 - profit distribution and other transfers from the entire profit-seeking sector and its employees; 7 - subsidies and other state budgetary financing of production losses; 8 - budgetary and credit financing of households, services and defense sectors as well as of capital investment, capital repair, inventories and reserves; and 9 - the financial balance of households, services, budgetary and credit sectors.

Rows between sections 1 and 3 and between sections 2 and 4 contain data on capital depreciation. Rows between sections 3 and 7 and between 4 and 8

contain data on transportation and distribution expenses incurred during the delivery of civilian and defense goods to final users. Rows under sections 7 and 8 contain data on stocks of fixed capital, inventories and reserves as well as on the number of employees in all sectors of the economy. The row for profit in section 3 is divided into major items on the profit distribution list, including capital outlays, working capital, bonus wages and transfers to services and budgetary-credit sectors.

Nine sections of the Unified Balance are presented in the following matrix form (see the next page for the detailed description of rows 1-2-3, 3-4-6 and 7-8-9, and columns 1-3-7, 2-4-8 and 5-6-9):

| 1 2 5 |

| 3 4 6 |

| 7 8 9 |

The mathematical relationship between sections is depicted by means of vectors. Vector (V) 1,2 stands for the sum of intermediate and end products which equals the total supply of capital and consumer goods available for end use. V 1,2 equals V 1,3,7 which adds price components of all supplied producer and consumer goods. Prices of supplied goods consist of material, depreciation, labor and other production outlays, the net profit and turnover tax reduced by the amount of subsidies, other components of value added (including imports in domestic rubles and net exports), and the total delivery cost. V 2,4 stands for the total volume of civilian and defense services and defense production output. V 3,4,6 groups the same types of revenue received by households, services and budgetary and credit sectors, while V 7,8,9 groups the same types of outlays of these sectors. V 6,9 sums all revenues received by these sectors.

The financial balance of household income and outlays equals monetary savings. Organized savings are treated as revenues of the credit system, while non-organized savings remain outside state-controlled financial flows. The budgetary balance represents either deficits or additions to financial reserves. In other sectors, the financial balance stands either for unspent revenues or financial losses.

In their presentation of the Unified Balance, Belkin and his associates leave blank not only section 5 but also section 7. Following input-output schemes, they subtract subsidies directly from the turnover tax within section 3.¹ Their approach is rejected here because it leads either to the increase in the value of material outlays of light and food industries compared to their NEB coverage or to the imbalance between the production and end use of agricultural goods. The proposed approach to registering subsidies thus corresponds to that chosen by planners in their compilation of the GSP balance where subsidies reduce the value of agricultural goods available for end use. In their estimation of the GSP and national income by sector, planners subtract subsidies from the turnover tax which is registered in its entirety in the industrial sector, even though agricultural labor also contributes to generating this component of value added.² The proposed approach also makes it possible to register other production losses financed by the state budget that reduce value added.³

There are two other differences between the version of the Unified Balance proposed by the above economists and that proposed in this study. First, these economists make no distinction between civilian and defense production sectors, nor between civilian and defense services and their employees. In the Unified Balance proposed in this study, rows containing data on household financial activities in sections 8 and 9 are divided into three economic spheres in accord with planners' practices. Budgetary outlays on capital investment, repair, working assets and wages are also divided in the same way.

Second, the above economists pay no attention to planners' division of social ownership of capital into state, cooperative, collective and private sectors. The authors of the official statistics report financial data only for the state-cooperative sector and omit most data on production activities of the private sector. Following planners' practices in the area of social ownership of capital proves very useful for closing official statistical gaps for consumption and investment components of national income.

2.2 THE GSP BALANCE

The GSP balance contains data on the supply and end use of particular goods. In unified accounts, the GSP balance is represented by V 1,2 and V 1,3. Rows in section 1 consist of supply sectors, including 10 civilian industrial sectors, agricultural, construction and other production sectors. Transportation, trade and other distribution sectors are excluded from these rows because these sectors participate in the delivery rather than the production of goods. Columns in section 1 consist of demand sectors engaged in both the production and delivery of producers and consumers goods. The intersection of rows and columns inside sector 1 stands for the value of supplied material inputs or for material outlays depending on the chosen vector. Total for rows equals the intermediate product, while total for columns equals material outlays of civilian production sectors.

Rows between sections 1 and 3 consist of total depreciation, including capital replacement, repairs and writeoffs (undepreciated value of liquidated fixed capital). Rows in section 3 include components of the produced national income (PNI), which is divided into wages and revenues received by enterprises. In the GSP balance, purchasers' price is divided into production outlays, net profit, the turnover tax and surcharge paid for the delivery of goods to final users. Producers' price excludes the turnover tax and surcharge for delivery. Production outlays are divided into material, depreciation, labor and other outlays. Labor outlays consist of regular wages and social security deductions. Other outlays are incurred outside the immediate production process and are connected with research, administration, business operation and maintenance, business trips, special bonuses, etc.⁴

In order to unify GSP with other accounts it is necessary to disaggregate other production outlays into material, depreciation, wages and transfers to service sectors. The latter include payments for outside research, preparation of qualified cadres as well as payments to higher institutions that oversee production activities of enterprises. In agriculture, these transfers also include payments to state

insurance agencies. Transfers registered as part of production outlays must be distinguished from those registered as part of the net profit.

Wages reported in the official statistics exclude other earnings but include most bonus wages that are part of the net profit. In order to avoid double counting of these bonus wages, the latter must be subtracted from the sum of total revenues and wages in estimating the net output. The official wages must be decreased by the difference between bonus wages and other earnings in estimating the wage component of production outlays. The difference between the gross and net output equals the sum of material and depreciation outlays of civilian production sectors. Material inputs and depreciated capital of services and defense sectors are registered in the NEB as the net output of civilian production sectors.

When Soviet planners compile the NEB they treat imports as an additional resource of goods available for end use. From this standpoint, they are justified to estimate the total net output as the net domestic product plus the difference between imports and exports. Soviet planners call this sum "national income available for end use" (NI). The produced national income (PNI) exceeds national income available for end use by 1) the balance of foreign currency reserves and 2) planned production losses registered in the agricultural and construction sectors.

The balance of foreign currency reserves is positive when exports exceed imports in gold rubles and negative when the opposite is the case. The positive balance indicates that foreign currency earnings are not used to bring more imports for end use, while the negative balance signifies that additional imports are purchased by depleting foreign currency reserves. Since gold rubles have no use in the domestic economy, the foreign trade balance is converted to domestic rubles with the export efficiency coefficient when the balance is positive and with the import conversion coefficient when the balance is negative. These coefficients measure the ratio between foreign trade indicators in domestic and gold rubles.⁵ In contrast to the foreign trade balance, planned losses are always subtracted from the already produced resources. Planned losses are not registered together with material outlays because these losses take place outside of the production process.⁶

Since GSP accounts deal only with the flow of goods, these accounts exclude additions to foreign currency reserves. In order to unify GSP and national income accounts, section 2 must contain a column for this balance. Otherwise, the total for value added in section 3 would be larger than the end product in section 2. In order to balance the totals for supply and demand for goods, section 3 must include a row for imports, while section 2 must have a column for exports. Data on the balance of total imports and exports is stored in section 4 of the Unified Balance together with other data on the distribution of national income. A separate NEB table is needed to store data on the foreign trade balance for particular production sectors.

Columns in section 2 containing data on the domestic demand for goods are divided into household and public consumption, capital investment and repair, production and trade inventories, reserves and planned losses. Capital investment is divided into capital replacement, additions of capital and unfinished construction. In national income accounts, the investment fund excludes capital depreciation and losses. Capital depreciation of services and defense sectors is

registered as part of the consumption fund of national income. In the officially published input-output table, investment is not disaggregated into capital depreciation and net investment. In addition, planned agricultural losses are hidden in the consumption column, while planned construction losses are hidden in the investment column.⁷ This approach complicates the disaggregation of total capital investment into gross and net components and into production, service and defense sectors.

Household consumption includes the following components: retail trade purchases of goods for current consumption (except for used goods), purchases of utilities, consumption of privately produced goods, food packages given as wage substitutes, depreciation of residential housing, and consumption by the armed forces. Public consumption by household services, science and administration sectors is divided into current material outlays and capital depreciation. Current material outlays are in turn divided into purchases made through wholesale and retail trade systems. In order to avoid the overestimation of civilian consumption it is necessary to disaggregate the total retail trade turnover into purchases made by household and public sectors. Similar to other Soviet institutions, the armed forces procure food products through the retail trade system.⁸

The results of this study indicate quite large gaps in both GSP consumption and net investment components, which are attributed to concealed material and depreciation outlays incurred in connection with weapons production, defense construction and maintaining the armed forces. While Soviet and Western authors ignore the consumption gap, they claim that the investment gap represents additions to weapons stock. The existing evidence analyzed in Section 11 suggests, however, that planners treat material and depreciation outlays of the armed forces as part of the consumption fund, and material outlays on the defense production as net investment. The noted planning practice apparently emerged as a solution to a problem faced by the authors of the official statistics as to how they should conceal Soviet military expenditures most efficiently.⁹

Net additions of capital are estimated as the difference between total additions and capital replacement (including capital losses). Total additions of capital include capital investment, equipment commissioned by budget-supported organizations, and additions to productive livestock and gardening of private producers. Planners divide net additions into installed fixed capital and unfinished construction. Defense construction is excluded from capital stock. Production inventories are divided into current inventories of materials, finished and unfinished products, young livestock and other. Nonproduction inventories include consumer goods stored by trade organizations and industrial enterprises as well as state reserves.¹⁰ Strategic reserves stockpiled for war purposes are registered separately from other inventories. Gold reserves are treated as financial (non-material assets) and hence are excluded from state reserves.¹¹

The military product or military expenditures included in the GSP hence consist of the value of capital goods delivered to the defense sector and the value of consumer goods purchased by defense sector households, defense-related science and the military. The value of capital goods equals investment into and materials of the defense sector. The value of consumer goods equals net monetary income of all defense sector employees, including defense research and retired personnel, that

is available for consumption of material wealth plus depreciation of these employees' housing plus appropriations on food, uniforms and other consumer goods for the military.

Since the value of services is excluded from the GSP, the military consumption of these services also must be excluded from the military's share of the GSP. This certainly leads to the underestimation of the defense budget by the amount of revenues received by non-production organizations from the defense sector employees and the armed forces. The defense budget also includes social security deductions, savings of administrative expenditures, income taxes and other deductions collected from the defense sector that reduce this sector's disposable income. In sum, the defense budget exceeds the military product by that part of defense income that is not allocated for purchases of goods.

2.3 DISTRIBUTION OF NATIONAL INCOME AND FINANCES

One of the major functions of the Unified Balance is to help planners trace sources of income available to each economic sector for purchases of material wealth and non-productive services. The original source of all value added is gross income received by civilian production sectors, data on which is stored in section 2. After its production, value added is transferred by two channels. The first channel contains transfers from civilian production enterprises to in-house and outside service sectors, to the state budget and credit organizations. The second channel contains transfers from civilian production employees to profit-seeking services, budgetary and credit organizations.

The total income received by services is then divided into that received by enterprises and their employees. Further distribution of income from the service sector is similar to that of the civilian production sector. All income of the budgetary and credit sector collected from civilian enterprises and households is then distributed in accord with the party's particular objectives in areas of capital investment, working capital, social programs, foreign trade and defense activities. sections of the Unified Balance must be designed in such a way as to integrate the distribution of national income and financial flows most efficiently.

Rows in sections 3 and 4 contain data on revenues of civilian production, service and defense sectors. The entire difference between the total net revenues received by enterprises and their net profit is extracted to the state budget. In addition, around 66 percent of the net profit is also extracted to the state budget, while another 7 percent is collected by credit organizations. In effect, enterprises have 28 percent of their net profit for end use, including 8 percent for bonus wages and 4 percent for household services. Consequently, enterprises have only 15 percent of their net profit for investment purposes and for forming financial reserves.¹²

Rows in sections 8 and 9 contain data on household outlays on purchases of consumer goods and services and transfers to the budgetary and credit systems. Membership dues are treated as transfers to service sectors, while financing of cooperative housing and purchases of livestock as capital investment. Columns in sections 6 and 9 contain data on all types of household income, including wages

and other such earnings, pensions and other transfers from the state budget and collectives, as well as payments received from the credit system.

Rows in sections 8 and 9 also contain data on state budgetary financing of current and capital outlays of service and defense sectors as well as capital investment of civilian production sectors. The latter type of financing increases the total income available to civilian production sectors for end use. As noted above, section 9 is primarily designed to store data on the financial balance of each economic sector.

2.3.1 Conversion From Current to Constant Prices

The NEB tables are compiled in both current and constant prices. Current prices are used for annual planning purposes, while constant prices are used for long-range planning of growth rates, labor and capital productivity trends. The methodology for converting current to constant prices has never been fully explained in Soviet literature. For example, it remains unclear why planners fail to account for differences between structural changes in production and consumption activities.¹³

When planners estimate material outlays in constant prices they use the structure of material outlays that existed during the base year. In this way, the disturbance effect of structural changes is eliminated. However, when they estimate the end use of national income in constant prices they make no effort to account for changes in the structure of consumption and investment funds. This fact apparently explains most of the difference between price indexes estimated for the PNI and national income for end use. Some of this difference is also caused by the fact that the PNI includes planned losses and a surplus of foreign trade revenues.

In view of the above, it is necessary to compute two price indexes: one for the production and another for the end use stages of the annual production cycle. Production indexes are compiled for the gross value of output (GVO) in producers prices with and without the turnover tax, as well as for material outlays, depreciation and profit. Indexes for the net output, the turnover tax and wages thus can be estimated using a residual method. Purchasers' prices exceed producers' prices (with the turnover tax) by the amount of delivery cost. Compilation of price indexes for transportation, supply, trade and other distribution services can be completed successfully only within the framework of the detailed input-output table. Otherwise, approximate calculations cannot be avoided. This partially explains why planners do not take into consideration structural changes when they estimate the end use of national income in constant prices.¹⁴

Planners first compile separate consumption and investment indexes and then combine them into one national income index. Different methodologies are used to compile indexes for retail trade purchases, consumption of agricultural goods procured outside the retail trade system, utilities, material outlays of services and defense production sectors, inventories, capital investment and repair. The lack of data on these methodologies makes it difficult to test official indexes for the entire consumption and investment funds with the desired precision.

Approximate tests, however, are possible by deriving indexes for particular supplied goods whose value is estimated in purchasers prices.

No data is available on the way planners convert the values of services and defense production output from current to constant prices. In fact, these values have never been reported in constant prices. While Soviet preoccupation with military secrets is well known, the absence of data on service sectors is surprising. In an attempt to obviate this information gap, prices for services and defense goods can be divided into components (materials, depreciation, wages, social security deductions and profit) the data on which can be derived in constant prices.

2.4. THE ESTIMATION PROCEDURE

2.4.1 Sources of Data

Most of the data needed for the compilation of unified accounts is presented in four official statistical handbooks published by the Central Statistical Administration (TSU), the CEMA Secretariat, the USSR Finance Ministry, and by the Foreign Ministry. The TSU annual publications referred to here as the NKh, constitute the major source of information on the Soviet economy. The annual CEMA publications are useful primarily for collecting data on capital investment and on national income produced by the trade and distribution sector (T&D). Publications of the USSR Finance Ministry are published every five years and contain detailed information on All-Republic Budgets. The Foreign Trade Ministry's annual publications contain the most detailed information on Soviet imports and exports in gold rubles. In addition, the TSU publishes a monthly periodical called Vestnik Statistiki which sometimes includes statistics on labor resources, wages, services and prices that in effect supplement the NKh.

Soviet authors rarely publish informative statistics because they themselves have to work with the same official publications that are available to Western researchers. There are some notable exceptions in such areas as input-output studies, agricultural finances, depreciation and nonproduction services. The reasons why Soviet censors decided to expand the scope of official statistics and to release data that is usually unavailable to academic economists are unclear. It is possible that certain Soviet academic economists were granted access to the unofficial data and were later permitted to make it public. In most cases, however, it appears that officials made a choice to educate the public, particularly academic economists who display a very poor knowledge of Soviet planning methods and their application in the preparation of the official statistics.¹⁵

It must be emphasized that most of the additional data presented in secondary Soviet sources is fragmentary, simplifies the estimation of economic indicators that TSU officials are least concerned to conceal, and requires extensive testing for reliability. Tests for reliability are based on the assumption that, whatever gaps may exist in the official statistics, the latter must remain internally consistent. Thus, when data offered by Soviet economists contradicts two or more independently derived pieces of evidence, this data must be discarded as unreliable. For example, running this type of test ultimately led to a crucial

conclusion made in the present study that the end military product is excluded from the GSP and national income.

2.4.2 The Production and End Use of Goods

The NKh regularly includes data on the GSP and produced national income (PNI) by sector as well as data on the GVO (Gross Value of Output) of particular industrial sectors in constant producers prices. The difference between the GSP and PNI equals the sum of the intermediate product and total depreciation of productive capital. The intermediate product hence can be estimated as the difference between this sum and total depreciation. The NKh includes data on depreciation funds which must be transformed before it can be used for the compilation of the GSP balance. First, one must estimate depreciation funds of productive sectors. Second, one must reduce these funds by 10 percent to account for those funds that are not used for capital repair purposes.¹⁶ Third, one must add depreciation funds of collective farms. And fourth, one must add unamortized writeoffs (the undepreciated value of liquidated capital minus revenues collected during the disassembly of capital). Writeoffs are quite small for sectors outside industry and agriculture. Data on industrial and agricultural writeoffs can be found in secondary Soviet sources.¹⁷

Data on total depreciation (excluding writeoffs) of the entire industrial capital as well as that of particular industrial sectors can be derived using the NKh table on the structure of industrial production outlays. The same table can be used to obtain material outlays (intermediate product) of particular industrial sectors. Labor outlays provide a key to translating this table from percentage to value terms for several industries, except for the MBMW, non-ferrous metallurgy, other heavy industries, light and food industry. Labor outlays equal wages plus social security deductions minus bonus wages. Other earnings of employees are registered together with other production outlays. Wages can be estimated by multiplying the average number of employees by their average monthly salary and by 12. Data on employees is available only until 1975. However, one can use the NKh data on the growth of labor productivity and gross output to derive data for the post-1975 period. Data on wages is reported in the TSU periodical, while data on social security deduction rates can be found in secondary Soviet sources.¹⁸

The NKh table on industrial production outlays is difficult to use because of the so-called "other production outlays," which aggregate other material, depreciation and labor outlays and transfers to non-production sectors. The size of these outlays is fortunately small for most sectors. Other labor outlays and transfers can be first determined for the entire industrial sector which then can be disaggregated into particular sectors proportionally to these sectors' wages. The same approach can be used to disaggregate total bonus wages which are regularly reported in the NKh. Data on other labor outlays of the entire industrial sector can be determined using the published input-output data in combination with national income statistics, both of which are discussed below.

The price index for the light and food industry can be derived independently using the NKh table on the structure of industrial prices and secondary Soviet sources on price indexes. The findings, which appear credible, indicate that the noted price index remained unchanged from 1975 when it equaled

1.0 to 1981. Data on nonferrous metallurgy can be found in secondary sources for several years. The correlation between the ferrous and nonferrous metallurgy is applied to extrapolate data for other years. Data on the GVO of other heavy industries in producers' prices can be found indirectly by first estimating the total supply of goods produced in these sectors. The GVO of MBMW can be estimated as a residual in both current and constant prices. The GVO equals the sum of outlays and profit. Financial profit is regularly reported in the NKh. The correlation between this profit and that used to estimate the GVO of particular industries can be found in secondary Soviet sources.¹⁹ What makes the estimation of production outlays of particular sectors less difficult is the fact that price indexes remained the same for many industries for several years, especially during 1975-1981.

The purpose of the above estimation procedure is twofold: to determine the GVO of particular industries in producers prices as well as material outlays of all Soviet economic sectors. It must be emphasized in this regard that the foreign trade sector earns only net revenues. Consequently, the difference between the GSP and PNI produced by all other production sectors, including foreign trade, can be equated with the sum of material outlays and depreciation of the entire trade and distribution (T&D) and other production sectors.²⁰ The available input-output data indicates that material outlays of other production sectors changed little over the extended period of time. This fact justifies the extrapolation of data for the rest of the observed period. The GSP produced by other production sectors can be estimated as the sum of these sectors' material outlays, depreciation and net product, which is discussed below. The same approach is applied here to estimate the T&D GVO.

The derived material outlays of particular industrial and nonindustrial sectors then can be used to obtain the value of particular goods that form the so-called "intermediate product" that is unavailable for consumption and investment. Input-output data published in secondary Soviet sources indicate that the structure of material outlays changes slowly in the short-run.²¹ Factors that affect this change include technological progress, price reforms, and production failures. The first factor is behind the dramatic increase of MBMW and chemical products allocated for interindustry use. The second factor is behind the distortive effect of prices on the correlation between technological progress and the change in the structure of material outlays. The impact of the third factor is most evident in the fluctuations in the value of agricultural raw materials used as intermediate goods.

The policy of subsidies also affects these fluctuations. The size of these subsidies was recently revealed by a Soviet planner who is one of the architects of the noted policy. His data is instrumental in determining the so-called "net agricultural subsidies" which equal the difference between the total subsidies and surcharges (budgetary revenues from price differences on agricultural raw materials).²² Total net subsidies equal the industrial GVO estimated in producers prices plus turnover tax collected as budgetary revenue minus the industrial GVO that is regularly reported in the NKh table on the GSP. Total net subsidies include not only net agricultural subsidies but also net industrial subsidies. The latter equal the difference between subsidies on MBMW, chemical, fuel and other industrial products sold to the agricultural sector and surcharges on spare parts and added taxes on some MBMW consumer durables. While the noted Soviet source

reveals information on the industrial subsidies, the value of industrial surcharges has been quite small during most of the observed period.

In order to use the input-output data on the structure of material outlays for the purpose of compiling the GSP balance, it is necessary to reduce the input-output data by the amount of net agricultural subsidies and the total delivery cost of each category of product. The total delivery cost equals the sum of the transportation and communication (T&C) GVO and T&D GVO. The input-output data on the delivery cost can be extrapolated for the rest of the observed period by applying the ratio between T&C and T&D on the one hand and the GVO on the other for each category of industrial and non-industrial goods.

The total supply of goods equals the sum of the GVO estimated in producers prices, T&C and T&D, turnover tax less net subsidies, and imports estimated in domestic rubles. It must be emphasized that net agricultural subsidies reduce the total supply of agricultural rather than light and food industrial goods. Consequently, in contrast to the input-output table, the GSP balance includes data on the total supply of agricultural goods that equals the sum of GVO less subsidies, TC & TD and imports. Meanwhile, the total supply of light and food industrial goods equals the sum of GVO, T&C, T&D and imports.²³

The turnover tax included in retail prices of light and food industries is reported in secondary Soviet sources for most of the observed period. The turnover tax of the heavy industry hence can be determined as a residual. Most of this tax is included in the prices of MBMW products and fuels. The size of this tax in all other heavy industries changed quite slowly during the observed period. The proposed procedure for estimating the turnover tax *included in prices on fuels* also makes it possible to determine the turnover tax on MBMW products as a residual. One can observe that most turnover tax estimated with the so-called "per-unit method" is collected from the sale of fuels and bread products. Data on turnover tax estimated with this method as well as on turnover tax included in prices of bread products is reported by Soviet authors. Data on turnover tax included in the prices of fuels products has been cited by Western researchers who relied on Soviet sources that were unavailable to this author.²⁴

The value of foreign trade balance can be estimated using the national income statistics. This balance equals the difference between imports and exports plus foreign trade revenues--all estimated in domestic rubles. Foreign trade revenues are excluded from the total supply of goods but are included in the total resources generated by the economy during a given year. Data on exports of many categories of industrial and agricultural goods in domestic rubles can be derived for the early 1970s using a variety of secondary sources.²⁵ The latter can also be used to measure the relative decline of domestic prices compared to CEMA and world prices for the period ending in 1977.

The export conversion coefficient that measures the ratio between exports in domestic and world rubles declined from 1.6 in 1970 to 1.3 in 1973, to 0.95 in 1975, to 0.83 in 1977. Exports of MBMW and fuels products constituted more than 60 percent of all Soviet exports during that period. One can also observe that the import conversion coefficient declined from 2.67 in 1970 to 1.72 in 1975. It remained on the same level during 1975-1977. Data on exports of fuels in domestic

rubles for the post-1977 period can be derived using the NKh table on the balance of fuel and power. The estimation of exports of other goods can be based on continuing the trend established before 1978, taking into consideration changes in the domestic price index of exported goods.

This study's findings indicate that while the export conversion coefficient declined to 0.6 in 1981, the import conversion coefficient remained at 1.65 during 1978-1980 and dropped to 1.6 in 1981. Price reforms of 1982 caused a significant increase in both export and import coefficients. The findings for these years are based on the assumption that world prices changed little during 1982-1983. Imports of particular goods in domestic rubles can be estimated only approximately using the available data for the early 1970s and the known fact that the import conversion coefficient remained the same for consumer goods throughout the 1970s. Changes in the import conversion coefficient for particular capital goods then can be assumed to correspond to changes in the combined import conversion coefficient and changes in domestic prices on these goods.²⁶

The value of goods available for consumption and investment can be estimated by subtracting the following sum from the total supply: the intermediate product, depreciation of productive capital, planned production losses, and exports. Planned losses are registered in agriculture and construction. Total losses can be estimated using national income statistics. Losses in construction equal the difference between total uninstalled capital and additions to unfinished construction. Planned agricultural losses are then determined as a residual.

Consumption of goods includes the following categories: household purchases of consumer goods through the state-cooperative system, at village farmers markets, purchases of utilities (mainly power and gas), consumption-in-kind, depreciation of residential housing, material outlays and depreciation of nonproduction services and defense organizations, food and uniforms for the armed forces. The share of retail purchases made by organizations declined only slightly during the 1970s despite a significant increase in the total retail trade turnover. This fact can be explained by large purchases of food products by household service organizations. The most recent detailed analysis of retail trade purchases by civilian organizations is openly published only for the late 1960s.²⁷ However, it seems unlikely that the structure of these purchases would have changed dramatically during the observed period. It can be demonstrated that the noted analysis excludes purchases of food by the armed forces, even though Soviet planners treat these purchases as part of the retail trade turnover.

The NKh data on retail trade must be transformed in the following way:

- 1) food industrial products includes such items as tobacco, cosmetics, and soap as well as wine sold at ex-village markets by collectives;
- 2) agricultural goods include meat purchased by cooperative trade agencies from private producers and surcharge by dining organizations;
- 3) light industrial goods include haberdashery and rugs;
- 4) MBMW products include metal-work products and some sporting goods;
- 5) chemicals include some goods hidden in the residual but exclude pharmaceuticals;
- 6) producers goods include construction and agricultural materials, agricultural equipment and construction services;
- 7) fuels are sold for both private (can be derived from household budgets) and public use;
- 8) commission sales include automobiles, light and other industrial products;
- 9) retail

trade includes the movie and forest tax paid by households; and 10) most of the residual contains goods produced in other heavy industries.²⁸

Other consumption components include capital depreciation in housing, civilian services, armed forces and defense industries; household outlays on production-type utilities, including gas and electricity; consumption-in-kind of agricultural and other sector's products; and wholesale purchases of materials by civilian services and armed forces, including uniforms. In order to avoid double counting of retail purchases by organizations, it is necessary to estimate their total material outlays first and then subtract these purchases from the total retail sale of consumer goods.

The NKh includes data on inventories of the state-cooperative and collective sectors in two different sections. Moreover, the authors of the official statistics conceal inventories of collective farms together with non-agricultural capital. Data on the latter can be obtained, however, from secondary Soviet sources. These sources also contain data on the structure of inventories of collective farms. The NKh data on inventories of the state-cooperative sector must be disaggregated into inventories of industrial and agricultural production materials, repairs and tools; the unfinished industrial (mostly MBMW) and agricultural production as well as unfinished production in construction and forestry; young livestock; inventories of consumer goods; and state reserves of agricultural and industrial goods. State reserves are estimated as the difference between the total inventories of commodities and inventories of consumer goods. It can be demonstrated that most inventories stored by procurement agencies are state reserves of grain. State reserves of industrial goods hence can be determined as a residual.

The investment component also includes additions of fixed capital, unfinished construction, defense construction, and material outlays of defense production organizations. Additions of fixed capital are estimated as the difference between total additions of fixed capital (including capital investment, commissioned equipment and live stock) and its replacement value (including amortized writeoffs and losses). Capital replacement equals the difference between total capital depreciation and repair. Additions and replacement of capital are estimated separately for the construction and MBMW output for all production and service sectors of the economy. Additions of unfinished construction are estimated separately for the state-cooperative and collective sectors. Both defense consumption and investment are determined as a residual after accounting for all civilian consumption and investment.

2.4.3 Production and End Use of National Income

The NKh regularly includes the value of the PNI and national income available for end use, including consumption and investment. The difference between these two values equals the sum of planned losses and foreign trade earnings. The latter are treated as net exports in domestic rubles when exports exceed imports in gold rubles. Planners use the export conversion coefficient to convert net exports from gold to domestic rubles. Planners apply the imports conversion coefficient when imports in gold rubles exceed exports in gold rubles.²⁹

The NKh includes data on the PNI produced in industry, agriculture, transportation and communication, construction, and other sectors. The CEMA publications disaggregate data on the PNI of other sectors into that of T&D on the one hand and other production sectors and foreign trade on the other for the period ending in 1980. While most components of the net product of T&D can be determined using the regularly published NKh data (including the movie tax), the residual of this product that represents other net revenues changed little during the period ending in 1980. This fact makes it possible to extrapolate data on other net revenues for the post-1983 period and thus estimate the net product of T&D for this period with the desired precision. The net product of other production sectors includes wages, social security deductions, the net profit and the net product of private producers that is determined below. Average annual wages can be estimated by multiplying the number of employees in this sector by the average monthly salary of all state-cooperative employees and then by 12. Social security deductions and the net profit are of a relatively small size. Foreign trade revenues thus can be determined as a residual.

The PNI includes the following components: wages and other earnings of productive labor, the net profit (without bonuses), the turnover tax, social security deductions, other net revenues, and transfers to non-production services. Planned losses are excluded from the already produced resources of goods generated in the agricultural and construction sectors. All data on the wages of state-cooperative and collective employees can be derived using the NKh tables on employees, their average monthly salary and on collectives. Cumbersome estimations cannot be avoided in determining the total number of employees in the productive transportation and communication sectors as well as in industrial, construction and agricultural collective sectors. Data on other earnings of state-cooperative and collective employees can be determined for the years 1966, 1972 and 1977 using the published input-output data. Other earnings equal the difference between the total primary income of productive labor and the sum of the following: regular wages, net agricultural, construction and other products of the private sector. It can be demonstrated that the ratio between regular wages and other earnings has changed slowly during the observed period. The total primary income of production enterprises equals the difference between the PNI and total primary income of production employees.

The net products of private production sectors are estimated in different ways. The net agricultural product is estimated as the difference between the GVO and material outlays.³⁰ Even though the NKh only includes data on the growth rates of the GVO of private agricultural farms, Soviet authors publish data on this GVO in current rubles. They also publish data on the agricultural GVO of the public sector in constant rubles which can be subtracted from the NKh figure on the total agricultural GVO in constant rubles to obtain the agricultural GVO of the private sector in constant rubles. Soviet authors also reveal the ratio between material outlays and the GVO of the private agricultural sector. Data on the net agricultural product derived from the above data is approximately the same as the data derived from household budgets which are reported in the NKh.³¹

The net agricultural product of the private sector includes net monetary income received from sales to the public and household sectors which can be derived using the regularly published NKh data. The difference between the net

product and monetary income equals the sum of consumption and investment-in-kind. Investment-in-kind can be estimated by comparing the fixed capital of the private and public agricultural sectors. Net monetary income received from sales to households should be excluded from the total monetary income of the entire household sector to avoid double counting.

The net construction product can be estimated as the difference between the construction GVO of the private sector and the total purchases of construction materials which can be derived from household budgets. The construction GVO consists of capital investment into housing by individuals (without counting public construction services) that is regularly reported in the NKh, and capital repair works that can be estimated using data on private housing depreciation rates. The net product of other private production sectors can be estimated as the difference between the total consumption of goods produced by all other sectors and purchases of printing materials that are regularly reported in the NKh. Although data on total consumption of the above goods is only available for 1972, the net product of other private production sectors is quite small and thus could not have increased significantly.

The above estimation procedure focused on components comprising the primary income of production sectors. Transfers of this income to non-productive and budgetary sectors can be estimated by combining the NKh data and budgetary statistics. The NKh regularly includes data on the net profit and wages of the entire T&C sector. The productive component of this total is estimated using data of T&C sectors' PNI. Therefore, the net profit and wages of the non-productive T&C can be determined as a residual. The net profit is also earned by the communal, insurance, banking, cultural and other non-productive sectors. The NKh data on wages can be used to determine both wages and social security deductions of state service sectors. Wages of collective farmers who provide non-production services must be estimated independently.³²

Current material outlays and depreciation of non-profit services are estimated as the difference between the total value of services and labor outlays (wages and social security). Current material outlays and depreciation of profit-seeking services are estimated by combining the NKh data and secondary Soviet sources for the period ending in 1975. It can be demonstrated that the ratio between material and labor outlays remained stable during that period for T&C. This fact can be used to apply this ratio for the post-1975 period. Housing, communal and everyday services are financed by the public sector (housing subsidies which are regularly reported in the NKh) and by households. The findings indicate that the ratio between these two sources of financing remained stable during the period ending in 1975. This fact can be used to derive the total volume of these services for the post-1975 period. Data on household financing of the education, health and culture sector is reported in the TSU periodical and in secondary Soviet sources, while data on the budgetary financing of these services is reported in budgetary statistics.³³ Transfers from production sectors hence can be determined as a residual. The same approach is used here to determine transfers from production sectors to science and administration. Household outlays on administration are estimated by adding all dues collected from members of public organizations.³⁴

Capital outlays consist of capital investment and repair. In order to avoid double counting of these outlays it is necessary to estimate total investment into each production, nonproduction and defense sectors in addition to estimating capital repair and replacement in these sectors. While capital replacement and repair are included in the consumption fund, the net capital investment is included in the investment fund of national income. The total capital repair is first determined as a sum of total repair works performed by main and subsidiary enterprises. This total is then estimated independently as the sum of capital repair (construction and MBMW) works performed in each production, non-production and defense sectors. The average of the two results is then accepted as the final estimate. Testing of this estimate is performed indirectly by comparing the total construction GVO in current and constant prices. The latter is determined as a sum of construction works treated as capital investment, repair, and inventories. The derived construction price index is then used to convert the official data on construction works treated as capital investment from constant to current prices.

Soviet military expenditures are determined as a sum of wages, social security deductions, material outlays and depreciation of the armed forces, defense science and defense production sectors. Wages are determined as the difference between the total household outlays and the total income of civilian households. The total outlays include purchases of goods and services, dues and transfers to the state budget, as well as savings (both organized and unorganized). The latter can be estimated only approximately, using the ratio between the total wages and savings derived from the officially reported household budgets. The total income of civilian households consists of wages and other earnings, monetary income of private producers received from the public sector, transfers from the state budget and credit organizations and other. Social security deductions equal the difference between total revenues of the social security system and the sum of revenues received from the civilian sector.

Material outlays of the armed forces, except outlays on food, are determined as a residual after accounting for all components of the consumption fund of national income. Outlays on food can be estimated only approximately by making assumptions about per capita consumption of food in the USSR.³⁶ Total outlays on defense science are estimated as the difference between total budgetary outlays on science and budgetary outlays on civilian research and development. Outlays on defense science are then divided into wages, material outlays and depreciation using the ratio established in the entire applied research sector. Material outlays of defense production sectors are estimated on the basis of observed annual fluctuations in the size of strategic reserves. Depreciation of fixed capital employed in the armed forces and in defense production is determined on the basis of data derived after reconstructing the balance of fixed capital.

2.4.4 Financial Flows

In this study, financial flows are analyzed in conjunction with the distribution of national income. When analyzed independently, the official financial statistics reveal little about the transfer of resources from the civilian to the defense sector or about sources of financing other government programs and household activities. The integration of financial and national income statistics

provides a necessary key to unveiling Soviet financial secrets by making it possible to analyze financial flows between the production, non-production and defense sectors.

In accordance with the Soviet planners' Marxist approach, all financial transactions have the end material product as the original source of revenues in both public and private sectors. Since a certain part of private production activities has no direct connection with any financial transaction, this part must be excluded from the end product in estimating the total volume of new financial resources generated in the economy. These new resources equal the sum of depreciation of productive capital and the PNI reduced by the amount of consumption-in-kind and investment-in-kind. The total resources apparently include financial reserves of enterprises, ministries, the Council of Ministers, and State Banks. In an attempt to avoid the critical depletion of financial reserves, Soviet planners also resort to the supply of additional monetary resources to cover the defense sector's financial activities, primarily employees' wages and purchases through the wholesale and retail trade systems.

The official financial statistics include data on the formation of capital depreciation funds by sector, including capital repair and replacement funds. The financial data excludes unamortized writeoffs, but includes funds that are allocated for net investment purposes and that are extracted to the state budget. In addition, this data aggregates depreciation of production and non-production sectors and excludes collective farms. The information supplied by secondary Soviet sources and other official data on the industrial production outlays are instrumental in transforming the financial data on capital depreciation.

Total financial resources of the production sector must be divided into four parts: 1) transfers to the state budget, 2) transfers to non-production services, 3) payments to credit organizations, and 4) funds remaining for the end use. Net revenues received by non-production sectors must be divided in a similar way. Total state budgetary revenues include the turnover tax, payments from profit, foreign trade revenues, social security deductions and various taxes received from the public and household sectors. Revenues also include funds that remained unused during the preceding year. Some unused funds are transferred to credit institutions.

Budgetary outlays are divided into sectors as well as categories of financing. The latter include wages, pensions and other payments to households, capital investment and repair, forming of inventories and other working assets, including operational expenditures, agricultural and foreign trade subsidies, covering production losses, material and other outlays of budget supported organizations. Budgetary funds are also used to form financial reserves and as revenues of credit organizations. The latter finance capital investment and working assets of profitseeking enterprises. All categories of budgetary outlays can be estimated only by comparing budgetary statistics, with the regularly published financial and national income statistics. Data on financing capital investment can be found in secondary Soviet sources.³⁶

The difference between revenues and outlays of budgetary and credit systems is tantamount to total deficits of the Soviet financial system. Budgetary

deficits can be observed in two places: 1) by comparing the official total for budgetary revenues with the derived sum of all revenues received from public and household sectors and unused funds; and 2) by comparing the official total for budgetary outlays with the sum of all budgetary financing of production, non-production and defense programs. In turn, credit deficits can be estimated as the difference between all new issued credits and the sum of credit revenues received from enterprises, the state budget and households via transfers from savings accounts. It is assumed here that foreign credits are kept on separate accounts in convertible currencies and are not entered in planners' accounts in domestic rubles. The results indicate that most of the deficits result from the loss of currency by the state to households in the form of unorganized savings. The latter is a direct result of the inability of households to spend their money on goods and services which are in short supply.

2.4.5 Labor and Capital Resources and Their Efficiency

In contrast to the authors of the official statistics, Soviet planners deal with three types of labor and capital operating in productive, non-productive and defense sectors. Many Western observers fail to make the proper distinction between production inputs operating in different economic spheres. As a result, these observers fail to determine the efficiency of Soviet economic resources with any precision. Not only do these observers incorrectly assume that the defense production output is hidden together with the civilian production output, but they also apply no effort to estimating the total size of non-productive labor and capital and services.

The authors of the official statistics much complicate the task of measuring Soviet labor and capital productivity trends by concealing the size of the defense labor and its output. In addition, these authors create obstacles to the disaggregation of labor into productive and non-productive sectors and of capital into productive and defense sectors. In fact, the only two relevant indicators which are published in the official statistics are the PNI and NI. The process of analyzing the Soviet economic efficiency hence cannot even begin without first establishing a sufficient data base. The detailed procedure for preparing this data base is presented in Sections 5, 6, 9, 10 and 11. The objective of the following discussion is to summarize this procedure and to determine whether the derived data base is sufficient for analyzing Soviet productivity trends.

The total civilian labor force can be estimated as the sum of state-cooperative, collective and private sectors' employees. While data on state-cooperative employees and self-employed is regularly reported in the NKh, data on collective farms is listed in the TSU periodical. The derived total for the civilian labor force is presented as 100 percent in the NKh table on productive and non-productive labor. Using this table in combination with the NKh tables on state-cooperative and agricultural employees leads to the estimation of productive and non-productive labor by sector. As demonstrated in Section 9, TSU officials significantly underestimate the number of self-employed which contribute to generating the PNI. The total defense labor is derived here as the residual after accounting for all segments of the Soviet population, including the civilian labor, children, full-time students, non-working pensioners, disabled, dependents, unemployed and prisoners. The number of defense production employees is

derived here as the difference between the total defense labor and the number of men in the Armed Forces.

The average annual value of fixed capital stock must be estimated in both current and constant prices. Estimates in current prices are required for disaggregating the industrial capital into civilian and defense components using the derived data on capital investment and depreciation. The official statistical publications report on undepreciated fixed capital only in constant 1973 prices for all years, except for 1972-1974. The derivation of data for other years can follow the Soviet planners' method of estimating the difference between total additions to and liquidation of capital. The defense capital is estimated for industry, construction, transportation, distribution and science sectors. Inventories of production materials and unfinished production are also considered here as productive inputs.

The PNI and NI represent the net output of the entire production sector. As the authors of the official statistics admit themselves, the reported net output for industrial and agricultural sectors distorts these sectors' productivity because of artificially low agricultural procurement prices. In order to avoid this effect it is necessary to disaggregate the net turnover tax into two parts proportionally to industrial and agricultural inputs used in the production of goods whose prices include the turnover tax. The elimination of the distorting effect of prices increases the agricultural labor productivity and decreases the productivity of sectors engaged in distributing and processing agricultural goods.

The fact that the PNI is the actual measurement of the net material product is subject to debate. The PNI equals the sum of 1) domestically produced goods that are available for consumption and net investment; 2) the difference between imports and exports estimated in domestic rubles; 3) net exports estimated in domestic rubles and planned losses. As Soviet planners admit themselves, growing revenues from foreign trade are indicative of budgetary rather than production efficiency. In addition, planned losses are indicative of the general waste in the Soviet economy that cannot be attributed to a particular production unit. It seems that planners include planned losses in the PNI to conceal net exports, state agricultural reserves and net additions of capital rather than to determine the net material product. In view of the above, the analysis of the Soviet civilian labor productivity accounts for both the official PNI index and the independently derived net domestic output index.

The total net output of non-productive sectors is estimated as the sum of wages, social security deductions and the gross profitless bonus wages. This output also equals the difference between the total value of services and the sum of material and depreciation outlays. No data on the total output of nonproduction services can be found in the official statistics. As noted above, this data must be derived independently by estimating the volume of each particular service performed for households and enterprises. Although the policy of overpricing some services and subsidizing others makes it impossible to analyze the productivity of each service sector, the total output provides an insight into the entire service sector. It also allows one to analyze the productivity of all profit-seeking enterprises and of the entire civilian economy.

Since defense production enterprises do not earn profit, the value of their net output equals the sum of wages and social security deductions. While this practice allows Soviet planners to lower the cost of defense burden, it also prohibits any definitive analysis of productivity trends in this sector of the Soviet economy. Planners are able to estimate these productivity trends by comparing the cost of producing the same weapon system over the years. Such an analysis certainly must obviate the impact of prices on the cost of capital inputs which has been steadily decreasing.

An outside observer can perform a similar analysis by assuming that the technological innovation and planners' price policy have a diametrically opposite effect on the cost of producing weapons. In other words, any increase in the cost of capital inputs caused by the introduction of new technology is counterbalanced by the artificial decrease in prices on these inputs. This assumption makes it possible to estimate labor and capital productivity in the defense sector by comparing the wage index with the growth of armaments. The latter can be derived approximately from the published CIA reports on the growth of Soviet military expenditures which are estimated on the basis of weapons index compiled in physical units.

END NOTES

¹ V. Belkin, and A. Geronimus eds., *Model' Dokhod-Tovary i Balans Narodnogo Khozyaistva*, (Moscow: Nauka, 1978), p. 181.

² M. Eydel'man, "Kak Otrazhaetsya v Mezhotraslevom Balanse Nalog s Oborota", *Vestnik Statistiki*, No. 8, 1968, pp 57 - 59, and L. Gol'denberg, and V. Petrov, "Raschot I i II Podrazdeleniy i Stoimosti Struktury Obshchestvennogo Produkta", *Vestnik Statistiki*, No. 9, 1983, p. 31, provide the necessary information on the way planners register subsidies in the NEB and input-output table.

³ Section 7 of the unified balance can also include forest tax, deductions for geological works and for the use of water resources and other payments excluded from value added, such as the negative balance of state insurance payments of collective and state farms. Further research must determine whether it would make more sense to include planned losses in section 7 rather than section 3.

⁴ To this author's knowledge, the exact list of expenses registered as other outlays has never been revealed by Soviet officials. This fact much complicates the disaggregation of other outlays. Hence, approximate calculations cannot be avoided.

⁵ Belkin and Geronimus, pp. 232 - 233, claim that the difference between the PNI and NI may also contain the value of goods given by the Soviet Union to other countries for free, payments to the UN and other international organizations. This possibility is rejected here because it contradicts all planning manuals on the estimation of the PNI and value added of the foreign trade sector. For example, the table on growth of investment by sector found in *Sovet Ekonomicheskoi; Vzaimopomoshchi, Statisticheskii Ezhegodnik - 1983*, (Moscow: Statistika, 1983) p. 453, excludes such "noncommercial operations" from foreign trade activities. It seems that all "noncommercial operations," including sale of gold, are registered as financial transactions that lie outside material production and that by definition do not participate in generating the PNI.

⁶ These include losses of livestock due to murrain, losses of agricultural raw materials and food stocks due to poor storage facilities, and the abandonment of construction and drilling sites. Gol'denberg and Petrov, p. 30, also mention price discounts in the retail trade. According to planning manuals, only agricultural and construction losses are included however, in the difference between the PNI and NI. Similar to subsidies on the agricultural produce directly sold to households and losses from wage increases, price discounts constitute operating losses of trade organizations. According to the NKh 1974, p. 651, all such operating losses are excluded from the net profit but are included in the total for gross revenues. In this author's opinion, subsidies and price discounts must be registered as part of material outlays of trade organizations.

⁷ This conclusion, can be reached after comparing the official total for consumption of agricultural goods in 1972 published in the NKh 1973, p. 116, with the sum of the independently derived components of this total.

⁸ The author made this inference after comparing the total for consumption of food industrial products reported in G. Sorokin, et al., *Fakty i Tendentsii Razvitiya Struktury Narodnogo Khozyaistva SSSR*, (Moscow: Nauka, 1977), p. 29, and the sum of the independently derived household and public consumption of these products. See also E. Freidmunt, and M. Eydel'man, *Ekonomicheskaya Statistika*, (Moscow: Statistika, 1976), p. 155.

⁹ For the derivation of capital depreciation of defense production sectors refer to the sections in this study on capital depreciation and fixed capital stock.

¹⁰ This conclusion is based on the analysis of the structure of commodities stored by distribution sectors. J. Gillula, *Components of Gross Investment in 1977 and 1972 Input-Output Tables*, (Washington, D.C.: Data Resources, Inc., 1984), p. 5, reached the same conclusion after analyzing Soviet literature on the subject.

¹¹ Freidmunt and Eydel'man, p. 93, treated gold reserves as part of material reserves. These authors apparently referred to the production cost rather than financial value of precious metals.

¹² See this section on the distribution of national income for the detailed analysis of profit distribution. The official statistics report data on the distribution of gross profit which includes financing losses of those enterprises that did not earn profit.

¹³ A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov* (Moscow: Finansy, 1976), provides the most extensive criticism of official price indexes in the openly published Soviet literature. See particularly pages 19 - 37. M. Eydel'man, "Balans Narodnogo Khozyaistva -- Vazhneishiy Instrument Analiza Rasshirennogo Sotsialisticheskogo Vospriizvodstva", *Vestnik Statistiki*, No. 7, 1978, offers an informative overlook of the way planners converted the 1977 input-output table from current to constant prices by taking into consideration significant structural changes that took place during 1972-1977. The available evidence suggests that planners lack the necessary data base to take into consideration structural changes in the end use of national income on the annual basis.

¹⁴ See Belkin and Geronimus, pp. 221 - 246.

¹⁵ This particularly applies to numerous works by Eydel'man, Gol'denberg, Semenov and Volkov who are most frequently quoted in this study.

¹⁶ See V. Senchagov, et al., *Amortizatsionnyi Fond V Usloviyakh Intensifikatsii Proizvodstva*, (Moscow: Finansy, 1975), pp. 46 - 48.

¹⁷ V. Senchagov, p. 103, and V. Kochkarev, *Rol Kredita v Povyshenii Effektivnosti Kolkhoznogo Proizvodstva*, (Moscow: Finansy, 1977), p. 79.

¹⁸ T. Konyukhova, ed., *Sbornik po Finansovomu Zakonodatel'stvu*, (Moscow: Yuridicheskaya Literatura, 1980), p. 517.

- ¹⁹ *Vestnik Statistiki*, No. 5, (1980), and N. Glushkov, and A. Deryabin, *Tsena v Khozyaistvennom Mekhanizme*, (Moscow: Nauka, 1983), p. 191
- ²⁰ Gosplan SSSR *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), p. 699.
- ²¹ A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov*, (Moscow: Finansy, 1976), p. 142.
- ²² V. Semenov, *Finansovo-Kreditnyi Mekhanizm v Razvitii Sel'skogo Khozyaistva*, (Moscow: Finansy i Statistika, 1983), pp. 142, 146, 154 - 157, 165, 177 - 178, 182.
- ²³ Semenov, p. 119, and V. Sorokin, *Gruppy "A" i "B" Promyshlennosti*, (Moscow, Ekonomika, 1977), pp. 119, 121
- ²⁴ U. S. Central Intelligence Agency, *Handbook of Economic Statistics, 1983: A Reference Aid*, CPAS 83-100006, September 1983, pp. 160 - 167.
- ²⁵ U. S. Department of Commerce, *Domestic Value of Soviet Foreign Trade: Exports and Imports in the 1972 Input-Output Table*, by V. Treml and B. Kostinsky, Foreign Economic Report, No. 20, (Washington, D.C., Government Printing Office, 1982).
- ²⁶ The estimation procedure is much simplified by the fact that the conversion coefficients change insignificantly between price reforms.
- ²⁷ See A. Zaitseva, and P. Moroz, "Izuchenie Vyborochnym Metodom Pokupok Tovarov Organizatsiyami, Uchrezhdeniyami i Predpreyatiyami Roznichnoy Seti i na Kolkhoznom Rynke," *Vestnik Statistiki*, No. 5, 1971.
- ²⁸ The structure of retail trade is analyzed in A. Volkov, "Fond Lichnogo Potrebleniya v Staticheskome Mezhotraslevom Balanse Obshchestvennogo Produkta," *Ekonomika i Matematicheskie Metody*, Vol. 4, N5, 1968.
- ²⁹ See Belkin and Geronimus, pp. 204 - 215.
- ³⁰ Data on material outlays is available only for the early 1970s and for 1978. The input-output data can be used to estimate the net product for 1972 and 1977. These two sets of data are approximately the same as those derived from the official household budgets.
- ³¹ Discrepancies between two sets of results are quite insignificant -- around 0.2 - 0.3 billion rubles for most years of the observed period.
- ³² Total wages of these collective farmers are first determined as the difference between total wages of all collective farmers and those received by agricultural, industrial and construction workers. Total wages of service personnel are then disaggregated into sectors according to employment statistics on service activities in collective farmers published in V. Tikhonov, ed., *Agrarnye Problemy Sotsializma*, (Moscow: Nauka, 1980).

³³ V. Rutgaizer, *Resursy Razvitiya Neproizvodstvennoi Sphery*, (Moscow: Mysl', 1975), p. 207.

³⁴ U. S. Congress, Joint Economic Committee, U.S.S.R.: *Measures of Economic Growth and Development, 1950-80*, 97th Congress, 2nd Session, 1982, p. 133.

³⁵ Ibid, p. 128.

³⁶ For example, refer to N. Zelenkova, *Finansirovanie i Kreditovanie Kapital'nykh Vlozheniy*, (Moscow: Finansy, 1979), pp. 54 - 55.

PART II

**SUPPLY AND END USE OF PRODUCER
AND CONSUMER GOODS**

3.0 SUPPLY OF PRODUCER AND CONSUMER GOODS

3.1 OBJECTIVES

Planners determine the total supply of goods as the sum of the domestic product, its transportation and communication (T&C) and trade and distribution (T&D) cost and the value of imports in domestic prices. The domestic product equals the sum of the gross value of output (GVO) in producers prices and the turnover tax reduced by the amount of subsidies while the GVO is estimated as the sum of production outlays and profit. The authors of the official statistics never reveal the value of supplied goods. Instead, they publish data on the total GSP by sector. Each year the NKh includes a table on the GSP of industry, agriculture, T&C, construction and other sectors. The GSP of industry that is registered in this table is estimated in producers' prices that include the difference between the turnover tax and all subsidies, including those that reduce the value of industrial goods sold to the agricultural sector.

Other sectors include T&D, foreign trade revenues, and a number of small production sectors listed in the Gosplan manual (forestry, publishing and movie houses, collection of scrap, and private production activities outside agriculture and construction sectors). The GSP of T&C and T&D sectors equals these sectors' surcharge in delivering produced capital and consumer goods to final users. Foreign trade revenues equal the difference between imports and exports plus the surplus of foreign currency revenues. The total supply of goods thus exceeds the GSP by the difference between exports and the surplus of foreign currency revenues. It is apparent therefore that the reason why Soviet officials conceal the value of supplied goods is that they are unwilling to reveal exports in domestic rubles. The total supply estimated with the NEB method is smaller than that estimated with the input-output method by the amount of subsidies and double counting of T&C and T&D GVO. This fact must be taken into consideration in using the official input-output data on total industrial and agricultural supplies published for 1972.

The objective of this section is to estimate the supply of industrial, agricultural, and other producer and consumer goods by adding up all components comprising purchasers' prices. Most turnover tax collected in the economy is registered as part of the industrial output. Only a small amount of this tax is registered as part of the T&D GVO. Similarly, most agricultural subsidies are subtracted from the turnover tax in estimating the industrial GVO for official statistical purposes. When planners estimate purchasers' prices they reduce the value of supplied agricultural rather than light and food industrial goods by the amount of agricultural subsidies. There are also subsidies on the MBMW, chemical, fuels and processed feed products supplied to the agricultural sector. These subsidies reduce the value of supplied industrial rather than agricultural goods.

Most of the estimation procedure presented in this section will focus on the GVO of industrial, agricultural and other production sectors in current and constant producers' prices, on the distribution of the T&C and T&D cost by sector as well as on the structure of the construction GVO. The turnover tax, subsidies, and profit are discussed in Section 5 as they relate to the national income statistics.

The derivation of imports are discussed in Section 8 as they relate to the foreign trade balance.

3.2 CONCEPTS OF PRODUCER AND CONSUMER GOODS

Soviet planners divide the GSP into Department I (producer goods) and Department II (consumer goods). While non-Marxist economists view this division as being based on arbitrary assumptions, Soviet planners consider it as one of their most crowning achievements that enables them to analyze the linkage between the current production and future production and consumption trends.¹ Even though the concepts of producer and consumer goods may be indeed arbitrary, these concepts provide the only available opportunity for understanding theoretical premises behind planners' practice of excluding the defense production output from the GSP. In addition, following planners' work in this area much simplifies the analysis of the official statistical coverage of civilian sectors providing the defense sector with producer and consumer goods.

Planners treat producer goods as capital employed in civilian production sectors and treat capital employed in defense production as consumer goods. In contrast, the authors of the official statistics try to conceal the defense production capital in the NKh table on the civilian production capital. In order to expose this concealment practice, it is necessary to estimate the value of producer and consumer goods at both production and end use stages of the annual economic cycle. Since this Section focuses on the production stage, the initial effort will be to estimate the official statistical data on the output of producer and consumer goods.

Producer goods consist of fixed capital (completed buildings, installations, machines and equipment as well as livestock and other agricultural capital) and working capital (intermediate goods, unfinished production, inventories of producer goods, and unfinished construction). The distinction between fixed and working capital is usually well defined. Whereas working capital is used during one production cycle, fixed capital remains operational during a number of years during which it loses its original value set at the time of installation, i.e., it depreciates. When the distinction is not clear, detailed planning regulations specify what types of capital outlays are treated as additions to fixed capital.² For example, all production tools and other gear whose unit value is below 100 rubles are treated as working capital regardless of their operational period.

Planning regulations seem most confusing with respect to spare parts, which in financial accounts are included in prices of finished machines and equipment. Since officially published tables are extracted from financial accounts, one must conclude that data on machines and equipment stored in these tables includes the value of spare parts. This coverage of fixed capital contradicts, however, the GSP and national income accounts where spare parts are treated as intermediate goods used in capital repair works.

Consumer goods can be divided into those purchased by individuals, nonproduction services, and defense organizations. Agricultural consumer goods include fruits, vegetable and eggs, as well as meats and milk produced on private

farms. Most consumer goods are purchased by households in retail trade stores. Consumption-in-kind (consumption by private producers) constitutes less than 10 percent of the total household consumption. Nonproduction services acquire goods at both retail and wholesale stores. Defense organizations receive goods for production and consumption purposes from wholesale organizations. One exception is the supply of food products which are usually sold by retail trade organizations. Reserve stockpiles are administered by supply and procurement agencies. All fixed and working capital used outside of the civilian production sphere is treated as consumer goods.

This author derived most information on the way planners estimate the value of producer and consumer goods from Gol'denberg and Petrov (1983), the two senior TSU officials, and from Zalkind (1976). While these Soviet economists explain nothing about the way one can disaggregate imports, the turnover tax, and the distribution expenses using the official statistics, they throw light on all other relevant issues. The TSU officials revealed for the first time, for example, how planners treat agricultural subsidies. All subsidies in light and heavy industry are part of Department I, and other subsidies, in particular food industries, are divided according to the proportion between producer and consumer goods established in these industries.³

The values of industrial producer and consumer goods are estimated at both the production and end use stages of the annual economic cycle. Planners can usually predict what industrial goods are produced for producer and consumer sectors during production stages. Some goods, however, can be used for both producer and consumer purposes. In this case, planners follow painstaking estimation procedures based on an analysis of the structure of production that existed during previous years and on anticipated changes during the current production year. The final result of these estimation procedures is the derivation of a coefficient for each category of goods for "mixed use" which illustrates what percentage of these goods is used for consumption purposes. The derived coefficients are periodically updated. Soviet officials have not revealed the size of these coefficients since the mid-1970s.

The estimation of agricultural producer and consumer goods is based on the division between commodity (goods exchanged for money) and non-commodity (goods that are never exchanged for money) agricultural produce. The following producer goods are part of the non-commodity produce: agricultural materials, unfinished agricultural production, and agricultural fixed capital. The following producer goods are part of the commodity produce: sales to state procurement agencies and purchases of agricultural materials by private producers through the retail trade system.⁴ Agricultural consumer goods can be computed either as a residual or as a sum of consumption-in-kind and all direct sales of agricultural goods to households, public organizations and trade agencies.

The disaggregation of the construction GVO into Department I and II is based on the analysis of capital investment into capital repair works performed for the production and non-production sectors. Construction-assembly and capital repair are estimated here for all production and nonproduction sectors. All other capital works are part of Department I. The entire communication sector's GVO is part of Department I. The division of the transportation sector's GVO into

Department I and II is performed for industrial sectors and agricultural sectors using the ratio between the producer and consumer goods estimated in seller prices. Almost all services performed by the trade and dining sector are connected with the sale of consumer goods. Likewise, almost all services performed by supply and procurement agencies are connected with the sale of producer goods. In order to obtain the value of goods in final purchaser prices, it is necessary to disaggregate the total distribution expenditures into those incurred during the sale of particular industrial and agricultural goods. The GVO of other small production sectors belong mostly to Department II with the exception of scrap collection and a certain part of forestry.⁵

Although little information exists on the way planners compile the foreign trade balance of producer and consumer goods, the detailed accounts published by the USSR Foreign Trade Ministry make it possible to make approximate estimates. Most Soviet exports consist of industrial raw materials, civilian machinery and armaments. Raw materials and civilian machinery belong to Department I, while military goods belong to Department II. The remaining exports consist of agricultural materials, light and food industrial producer goods. In contrast, most Soviet imports include civilian machinery, raw agricultural materials and consumer industrial goods.

The major estimation problems arise with respect to imported light and food industrial products. No information is available on coefficients used by Soviet planners to estimate the values of imported fabrics, sugar, meats and other goods used for both production and consumption purposes. As listed in the Gosplan manual, in the mid-1970's these coefficients for domestically produced goods were as follows: cotton fabrics - 54%; sugar - 50.4%; meats - 45.1%, and varied for other.⁶ It will be assumed here that the same coefficients are used to divide imports and exports of the noted goods into Department I and II. To simplify the estimation procedure, this author will divide the amounts of these goods in half. The TSU officials cited above suggest that planners divide imports using the same coefficients with which they divide the turnover tax into Department I and II. Consequently, Soviet planners also avoid making separate cumbersome calculations in the area of foreign trade, as they rely on the results attained after their division of turnover tax. Surplus foreign currency revenues will be treated as part of Department II because these revenues are not used for production purposes.

3.3 THE INDUSTRIAL GVO IN PRODUCER PRICES BY SECTOR

3.3.1 Classification by Sector

While planners continuously reorganize their list of industrial sectors, the basic outline of this list was only insignificantly altered during the 1970's. As specified in the Gosplan manual and publications of TSU officials, Soviet planners operate with the following list of major industries: 1) power; 2) fuels (petroleum, gas, coal and other fuels); 3) ferrous metallurgy; 4) non-ferrous metallurgy; 5) chemical and petrochemical (without pharmaceuticals); 6) machine-building and metalworking (including repair works), which is abbreviated here as MBMW; 7) wood and paper; 8) construction materials; 9) glass and china; 10) other heavy

industries; 11) light industry ; 12) food industry; and 13) cereals and processed feed industry.⁷

Other heavy industries include: microbiological and medical industries; printing, movie-making and recording studios; water supply services; production everyday services, including cleaning, laundry and photographic services; various consumer industries (that are not part of the MBMW, wood and paper and chemical industries) that specialize in jewelry making, arts and school supplies, musical instruments, toys, and sporting goods. Sporting goods includes rifles and other military type goods for hunting purposes. The Gosplan manual lists all "special" industries (planners' euphemism for armaments industries) under the MBMW heading.⁸ Given the fact that hunting rifles are manufactured by "special" industries, one cannot exclude the possibility that industries manufacturing military goods for export purposes are also hidden together with other industries in the NKh table on the industrial GVO by sector. In addition, one must test a hypothesis that subsidiary MBMW production performed outside the MBMW sector is also included with other industries.

In some planning manuals, industries that produce metal-base construction installations are registered together with those producing wooden-base construction installations. In the NKh this industry is divided into MBMW and construction materials sectors. In their division of the entire industry into heavy, light, and food industries, planners always treat the processed feed industry as part of other heavy industries. Since 1976 they have combined it with the cereals industry. Before that year the cereals industry had been treated as part of the food industry.

3.3.2 Industrial GVOs in Constant Prices

The NKh regularly includes data on the total industrial GVO in current producers' prices that exclude the turnover tax as well as a table on this GVO in constant prices by sector. During the observed period, the constant price level changed from July 1967 to January 1975 and to January 1982. Since this table is presented in percentage terms, it is necessary to derive the value of the industrial GVO (presented as 100 percent) in constant prices. The NKh lists the industrial GVO in current prices as well as its growth rates with 1965, 1970, 1975 and 1982 as base years. Growth rates are based on average annual price indexes that differ from price indexes estimated for the beginning of 1975 and 1982. The noted NKh table divides the industrial GVO into fuels, power, MBMW, chemical, wood and paper, light, construction materials, food and cereals and processed feed industries. The residual thus contains the ferrous and non-ferrous metallurgy, other heavy industry, and possibly other MBMW sectors mentioned above.

The estimation of the total industrial GVO in constant 1967 prices requires knowledge of 1970/1965 and 1967/1965 price ratios, whose comparison leads to the 1970/1967 price ratio. The industrial GVO derived in 1970 prices is divided by the noted price ratio to establish the 1967 price index. The industrial GVO in 1965 prices equaled 275.3 billion in 1967 and 344.1 billion in 1970. Between 1967 and 1970 the industrial GVO grew by 125 percent. The industrial GVO equaled 285.9 billion in 1967 in current prices functioning during that year. In 1970, this GVO hence equaled 357.4 billion in 1967 prices and 375.3 billion in current 1970 prices.

The price coefficient derived using the NKh data on growth rates equaled 1.047 (374.3:357.4).

Unfortunately, this coefficient is quite imprecise because the NKh data is published without decimal points. In 1981, Vestnik Statistiki, No.9, included for the first time a price index with 1965 as a base year. This index increased from 1.05 in 1967 to 1.09 in 1970. This signified that the coefficient for converting 1967 to 1970 prices equals 1.038 (109:105). In order to reduce the margin of error one can accept the average number 1.042 (between 1.038 and 1.047), thus obviating the problem with decimal points. The proposed procedure, however, does not address the problem of comparing 1967 and 1970 series by means of the 1965 series. A more precise approach would be based on the comparison of the 1967 and 1970 series. The authors of the official statistics understandably refuse to publish the 1967 series which would make it possible to rely on a more precise approach.

The derived price ratio for converting 1970 to 1967 prices leads to the industrial GVO in 1967 prices for all years of the period, ending in 1975. It is interesting to observe that the average annual price index equaled 1.004 in 1974 and 0.996 in 1975. It thus can be assumed that new prices set in January 1975, midway between July 1974 and July 1975, returned to the July 1967 level. In order to validate this assumption, one can compare the GVO's of heavy, light, and food industry in current and constant prices for 1975 using the noted NKh table as well as the NKh table on the structure of industrial prices.

The above estimates of the entire industrial GVO for 1975 in January 1975 prices are confirmed without any margin of error. This provides confidence in the derived 1970/1967 and 1975/1970 price ratios. Unfortunately, the 1982/1970 price ratio cannot be determined with the same confidence. Between 1970 and 1982 the industrial GVO increased by 1.9 times. In 1970 prices it then equaled 711.2 (374.3*1.9) billion in 1982. The industrial GVO in current prices equaled 721.5 billion in 1982. This indicates that the price index equaled 1.014 in 1982. During 1979-1981 the 1970 price index equaled 0.924. Between July of 1981 and 1982 it increased by 10 percent. Most of this increase took place in January 1982. Until more data becomes available it will be assumed that producer price changes have been insignificant for the industry as a whole since January 1, 1982.

3.3.3 The Residual

Even the most superficial analysis of the relative size of the derived residual must lead to a conclusion that it is too large for the metallurgical and so-called "other heavy" industries, which is referred to as "not elsewhere classified" (n.e.c.). In an attempt to support this conclusion with factual evidence the researcher can estimate the GVO of the metallurgy and other sectors first in current and then in constant prices. The procedure for estimating the GVO of ferrous metallurgy in current prices will be demonstrated below, together with those sectors on which data is available in both current and constant rubles.

The authors of the official statistics always exclude data on production activities of the non-ferrous metallurgy and n.e.c. sectors. Data on the entire metallurgy sector was reported, however, for 1966 and 1972, in connection with

input-output studies.⁹ Using this data it is possible to estimate the GVO as well as growth rates (price index in the entire metallurgical sector is assumed to be the same) in comparison with growth rates in the ferrous metallurgy. The established correlation in growth rates can be extrapolated for the post-1972 period. The margin of error depends on the extent to which the noted correlation shifted more or less in favor of the nonferrous metallurgy during the late 1970s and early 1980s.

Western researchers who reconstructed the 1977 input-output table made an unjustified assumption that the n.e.c. comprises the entire residual that remains after accounting for the total metallurgy sector. They were surprised with the large size of this residual but explain it in terms of the phenomenal growth of the n.e.c. during 1972-1977.¹⁰ In order to test their assumption one must compare the total supply of goods produced by the n.e.c. with their end use, which includes the intermediate product, retail and wholesale trade purchases, and additions to inventories and exports.

The n.e.c. GVO in current producers' prices can be defined as the difference between the domestic use of this sector's goods and the sum of the distribution cost and foreign trade balance (imports minus exports). There is enough data to determine the n.e.c. GVO with the margin of error below 0.5 billion rubles. The additional estimation error results from the assumption that this sector's price index was around 1.00 during the observed period. In 1975, the n.e.c. GVO equaled 9.0 billion, while the total residual equaled 20.0 billion. Subsidiary MBMW production and exports of armaments apparently accounted for most of the difference between these two figures. The independent estimates of the total MBMW GVO in current prices further validates the proposed approach to dealing with the residual.

3.3.4 The Structure of Industrial Prices

The industrial GVO equaled 513.4 billion in constant January 1975 prices (511.2 in current 1975 prices). In 1975, the GVO of light and food (excluding cereals) industries equaled 180.2 (85.7+94.5) billion or 35.1 (16.7+18.4) percent of the total industrial GVO in January 1975 prices. The GVO of cereals and processed feed industries equaled 14.9 billion or 2.9 per cent. Using the available input-output data, it can be determined that the ratio between the GVOs of cereals and processed feed industries is around 3 to 1. These GVOs thus equaled 11.3 and 3.6 billion respectively in January 1975 prices in 1975. The total GVO of light and food (including cereals) industries thus equaled 191.5 billion rubles in 1975 calculated January 1975 prices.

Until 1980 the NKh regularly included a table, in percentage terms, on the structure of industrial producer prices that include the turnover tax and supply expenses. This table has three sections: the entire industry, heavy industry (including processed feed), and light and food industry (including cereals). Industrial producer prices include the following components: production outlays of industrial and supply enterprises, their net profit and the turnover tax.

Altogether, the authors of the official statistics report data on three types of the industrial GVO, including GVO in the NKh and VS Tables on the structure of industrial prices in percentage terms, GVO₂ in the NKh table on the GSP by

sector, and the GVO_3 in the NKh table on industrial output. GVO exceeds GVO_3 by the sum of the turnover tax and supply expenses, while GVO_2 exceeds GVO_3 by the difference between the turnover tax and net subsidies. In 1975, GVO_2 and GVO_3 equaled 558.3 and 511.2 billion rubles respectively. As determined in Section 5 of this study, the turnover tax equaled 66.4 billion rubles in 1975. As determined later in this Section, supply expenses (GVO of the supply sector) equaled 6.2 billion rubles in 1975. It thus follows that GVO equaled 583.8 billion rubles and net subsidies equaled 19.3 billion rubles. The latter, in turn, equaled the difference between total subsidies (21.4 billion rubles) and surcharges (2.1 billion rubles), which included added taxes.

The derived GVO_1 of the entire industry leads to GVO_1 of heavy and light industries by solving this set of equations:

$$\begin{aligned} GVO_1 &= GVO_h + GVO_{lf} \\ GVO_h &= (PO/a)_h \\ GVO_{lf} &= (PO/b)_{lf} \\ PO_1 &= PO_h + PO_{lf} \end{aligned}$$

where h and lf are subscripts for heavy and light and food industries, respectively, PO stands for production outlays and a and b are the percentage shares of PO in GVO .

The known parameters are GVO_1 , PO_1 , a and b. The above equations can be combined into these two equations: $GVO_1 = (PO/a)_h + (PO/b)_{lf}$ and $PO_1 = PO_h + PO_{lf}$. These two equations contain only two unknown variables-- PO_h and PO_{lf} --and hence can be easily solved. The results are: $GVO_h = 343.0$ billion and $GVO_{lf} = 240.8$ billion. Supply expenses and the turnover tax of light and food industries equaled 1.6 billion and 47.7 billion respectively in 1975. The GVO of these industries in prices that exclude supply expenses and the turnover tax hence equaled 191.5 billion ($240.8 - 47.7 - 1.6$) in current prices. The procedure can be repeated for other years of the 1975-1981 period to determine that the 1975 price index of light and food industries remained on the same level of 1.00. Although for other years of this period the estimation error cannot be avoided due to the fact that a and b are reported only with one decimal point, price indexes published in the TSU periodical also confirm that the price index remained unchanged during that period. This periodical also includes data on the structure of industrial prices after this data disappeared from the NKh in 1980.

3.3.5 Current Prices

The disaggregation of the total industrial GVO in current producers prices into sectors is based here on combining three sources of data: 1) the NKh data on production outlays and net profit by sector; 2) the derived data in constant prices; and 3) the input-output data. The NKh regularly includes a table on the structure of industrial production outlays by sector in percentage terms. Production outlays are divided into the following components: raw and main materials, auxiliary materials, fuels, power, depreciation, labor outlays consisting of wages and social

security deductions, and other (other material, depreciation and labor outlays and transfers). In order to obtain the value of total production outlays it is necessary to estimate the value of one of the above listed components in current rubles. The authors of the official statistics make it possible to estimate only one component of production outlays with the required precision--labor outlays. However, even in the case of labor outlays some assumptions cannot be avoided.

There are three types of wages: regular, bonus and other. The official statistics include data on the sum of regular and bonus wages, but exclude data on bonus wages and other earnings by sector. The procedure is first to determine these wage components for the entire industrial sector and then to develop a method for disaggregating these wage components into sectors with the least margin of error. Soviet authors indicate that workers receive around 50 percent of distributed bonus funds, even though they comprise 80 percent of the industrial production personnel.¹¹ Most bonuses received by workers are included in their regular wages. Consequently, the size of the bonus wages must be a function of both regular wages and wages received by engineering and managerial personnel. The size of other wages is assumed to be a function of both regular wages and total other outlays. Social security deductions are estimated with rates that are applied to total wages paid by industrial sectors.

Total industrial production outlays are estimated as the difference between the GVO in producers' prices that exclude the turnover tax and the net profit derived from the NKh table on the structure of industrial prices. In 1972, total production outlays equaled 355.6 billion, while depreciation outlays equaled 19.2 billion (5.2 percent), labor outlays equaled 54.1 billion (15.2 percent), and other outlays equaled 4.3 billion (8.5 percent).

An attempt is made in Section 4 to use Soviet sources on the reconstructed 1972 input-output table to arrive at independent estimates of total depreciation outlays (19.5 billion rubles) which are 0.3 billion rubles larger than those derived above. One thus concludes that during the observed period other production outlays include other depreciation outlays in the amount of only 0.3-0.5 billion rubles, in addition to the unamortized writeoffs, which are also estimated in Section 4.

This startling conclusion simplifies the task of disaggregating production outlays into major components. The difference between the GSP and PNI that are regularly reported in the NKh equals the sum of total material and depreciation outlays. Total material outlays hence can be determined as a residual. Data on total material outlays automatically leads to other material outlays. The procedure then narrows to disaggregating other production outlays into other labor outlays and transfers. Other labor outlays and transfers of all production sectors are determined in Part III of this study using national income statistics. The derived components of industrial production outlays serve as control totals for the analysis of these outlays in major industrial sectors.

The standard procedure for estimating total production outlays by sector is the division of labor outlays by their percentage share in total production outlays. As emphasized above, the disaggregation of other outlays for each industrial sector can be performed only approximately. The margin of error is insignificant with

respect to transfers because of their small size. The margin of error for other labor outlays depends on the extent to which each sector's wage policy diverges from the national average. It is difficult to expect, however, that the total margin of error for other material outlays is above 0.2-0.3 billion because the size of other outlays of the entire industrial sector remained below 5.0 billion.

Instead, the problem with the proposed estimation procedure is that the NKh data on the structure of industrial production outlays is presented with only one decimal point. This significantly reduces the precision of estimation results for such material-intensive sectors as light, food, cereals and processed feed industries. In addition, the NKh table excludes data on the entire fuel sector for the pre-1976 period and on the cereals and processed feed industries for the pre-1978 period. Similarly, there is no information on the structure of production outlays of the non-ferrous metallurgy and n.e.c.. Each of the above problems requires a separate approach.

The GVOs of light, food (including cereals) and processed feed industries can be estimated for 1972 using the input-output data, such as that presented in Volkov (1976) on direct capital input coefficients.¹² According to Belkin and Geronimus (1978), the net profit of these industries is registered in the same way in the NEB and financial tables.¹³ Consequently, these industries' production outlays can be estimated as the difference between the GVO and the net profit. The input-output and NEB coverage of the GVO differ by the amount of agricultural subsidies and T&C and T&D charges which are double counted in input-output tables.

In 1972, price indexes of light and food industries equaled 1.03 and 1.045 respectively. As evident from NKh tables on price indexes, light industrial prices remained the same during 1970-1972 and during 1973-1974, while food industrial prices remained the same during 1970-1971 and during 1972-1974. According to commentaries printed in the NKh, prices in light industry were raised by 8 percent in 1973. The price index in food industry can be determined for 1970 by comparing price levels in 1967 and 1970 reported in the TSU periodical. The results seem reliable because the price index in both light and food industries was the same in 1970 - 1.03. Their production outlays are hence possible to estimate as the difference between the GVO and net profit for the entire period under observation.

In the process of analyzing the structure of production outlays in light industry, this author discovered that Soviet officials virtually made it impossible to derive these outlays using the wage statistics. The official data on these outlays is not compatible with the NEB format, as it leads to the underestimation of labor outlays by as much as 1 percent. This is one of the few inconsistencies in the presentation of the official statistics requiring a comprehensive examination that must touch on peculiarities in planners' estimation of gross output in light industries.

The information gap in the coverage of the entire fuel sector before 1976 is filled here by comparing the change in the structure of this sector's outlays with those of particular fuels sectors during the 1976-1980 period. What simplifies this comparison is the availability of the input-output data for 1972. The dearth of

data on the non-ferrous metallurgy can be obviated only by assuming that the structure of production is approximately the same in the entire metallurgical sector. The components of production outlays of n.e.c. are determined here as residuals.

3.3.6 Industrial Price Indexes

The GVO of industrial sectors in current prices can be divided by the GVO of these sectors in constant prices to derive these sectors' price indexes. Data presented in the end of this Section indicates a surprising price stability. For most sectors, new prices were introduced in 1967, 1969, 1972-1974 and in 1975-1977. Although the general industrial price index declined during the 1970's, the size of this decline is relatively small--8 percent. The most significant decrease took place during 1970-1971 (2.2 percent) and during 1975-1977 (2.5 percent). There was almost no change during other years. In fact, from 1977-1979 the index remained the same, at 0.97.

This general price stability conceals the differing price trends in heavy and light and food industries. Heavy industrial prices declined by 4 percent during 1970-1971, by 2.5 percent during 1972-1973 and by 6 percent during 1975-1977. The results presented in Table 3A do not reflect price changes in January of 1975 because this author saw no need to estimate indexes in both 1967 and 1975 prices for the year 1975. However, the following statistics are self-evident: the percentage share of the MBMW sector in the total industrial GVO declined from 27.8 to 24 percent, while that of the light industry increased from 14.9 to 16.7 percent as a result of price changes in January of 1975. This translates into the decline of the MBMW price index by 0.86 and into the increase of the light industrial price index by 1.12.

The 1967 MBMW price index declined from 1.03 in 1970 to 0.970 in 1971 and to 0.930 in 1973. The 1975 MBMW price index declined from 1.005 in 1975 to 0.960 in 1976, to 0.935 in 1977 and to 0.915 in 1979. Except for the decline of the chemical price index in 1981 to 0.910, the MBMW price index displayed the most significant decrease among industrial sectors. The derived MBMW price index can be used not only for testing the internal consistency of the official statistics (particularly in the area of growth rates), but also for determining the size of capital investment into machines and equipment which the NKh lists exclusively in 1973 prices and prices established on January 1969. The comparison of these two price levels leads to 0.964 (a 1973/1969 price ratio). A 1969/1967 price ratio then equals 0.965. This ratio can be used to convert the NKh data on investment into MBMW products from 1969 to 1967 prices and then to current prices.

3.4 INDUSTRIAL PRODUCER AND CONSUMER GOODS

The NKh regularly includes three tables on the industrial production of producer and consumer goods: on the division of the industrial GVO in seller prices, on producer goods, and on consumer goods. The first table divides the industrial GVO (estimated in prices that exclude the turnover tax) into producer and consumer goods in percentage terms. This table is difficult to use because the type of industrial GVO that is regularly reported in the NKh is estimated in

producer prices that include the turnover tax contained in prices on intermediate goods of the light and food industry. This turnover tax (t1) thus constitutes the difference between the industrial GVO in producer prices that is presented in value terms and the industrial GVO presented in the noted NKh table as 100 percent.

The estimation of t1 is based here on data reported in Sorokin (1977).¹⁴ In the mid-1970's, t1 comprised the following percentages of prices on light and good industrial products: sewn goods (0.358), bread products (0.139), confections (0.237), spirits (0.142), and wines and cognac (0.044). Data on canned food is presented in a disaggregated form, ranging from 0.014 for canned food and vegetable products to 0.183 for canned milk products. Considering the relatively small-scale production of canned milk products and the relatively large-scale production of canned food products, it will be assumed here that the ratio for all canned products is around 4 percent. For other products, the size of turnover tax is quite small. Since 1976 the NKh regularly includes a table on the production of consumer goods in current seller prices reported in percentage terms. As reported in Bor (1977), planners always compile the balance of consumer goods in producer prices that include t1.¹⁵ They exclude t1 only when they compare the relative weights of producer and consumer goods as in the first noted table. As Sorokin (1977) emphasized, this procedure makes it possible to avoid the overestimation of the value of produced consumer goods.¹⁶ Consequently, the percentage shares of sewn goods, bread products, confections, canned goods and alcoholic beverages that are reported in the NKh table on consumer goods include t1.

In 1975, these percentage shares were as follows: sewn goods (0.129), bread products (0.049), confections (0.037), and canned goods (0.031). These shares of t1 (included in producer prices on these products) in the total value of consumer goods thus equaled 0.0462 for sewn goods, 0.0068 for bread products, 0.0088 for confections, and 0.0012 for canned foods. For alcoholic beverages it can be assumed to equal around 0.001 because the share of the value of all produced alcoholic and non-alcoholic beverages in the total value of produced consumer goods equaled only 0.045. It is highly unlikely that the cumulative share of t1 in prices of all other consumer goods exceeded 0.001. The total share of t1 in the total value of produced consumer goods estimated in producer prices thus equaled 0.067. In 1975, the share of consumer goods (estimated without t1) in the total industrial GVO (estimated in producer prices without t1) equaled 0.263. The following equation then can be constructed for 1975:

$$t1 = 0.067 [(511.2 - t1) 0.263 + t1],$$

where 511.2 billion rubles stands for the industrial GVO estimated in producer prices. Solving this equation for t1 results in:

$$t1 = 9.0 - .018t1 + .067t1 \text{ and } t1 = 9.5 \text{ billion rubles.}$$

The margin of error is insignificant for the results attained for the mid-1970's due to the small size of t1 contained in prices of products not listed in the NKh. The margin of error for the early and late 1970's depends on the extent to which Soviet planners changed their policy on the collection of turnover tax, which is known to be stable in light and food industries.¹⁷

The derived information on t1 makes it possible to utilize the NKh tables on the division of the total industrial GVO into producer and consumer goods and on the division of the total value of producer goods into fixed and working capital. Before using the table on the division of the total industrial GVO, it is necessary to consider comments made in Zalkind (1976) and Fedoseev (1983) that all data on producer and consumer goods were reported in constant prices.¹⁸ These comments seem completely unfounded. Indeed, before 1976, NKh tables on producer and consumer goods were reported in 1967 constant prices. However, the comparison of NKh editions for 1967, 1974 and 1979 indicates no change in percentages of Groups "A" (producer goods) and "B" (consumer goods). Since new prices were introduced at least twice during the observed period, a change in reported percentages would have been inevitable if data on Groups "A" and "B" were reported in constant prices. Moreover, all tables included in the NKh have explanatory notes indicating whether prices are constant. The apparent reason why the NKh table on Groups "A" and "B" exclude a note on current prices is that prices reported in this table are not used for planning purposes. These prices are estimated artificially for deriving the real ratio between Groups "A" and "B."

NKh editions for 1973-1975 omit the table on producer goods. The fact that Soviet censors decided to make this omission serves as one of the most convincing testimonies to the credibility of the official statistical data, particularly with respect to its internal consistency and applicability for compiling the NEB. In 1973, TSU officials began the publication of data on fixed capital stock in current prices. They continued this until January of 1975. TSU officials apparently faced a dilemma regarding what data to reveal. If they included the table on producer goods for 1973-1975, this table could have been compared with data in current prices. Such an expansion of the available data base would have seriously weakened the TSU secret code with respect to the production and end use of producer goods, as NKh editions for 1973-1975 still included the table on the accumulation of fixed and working capital. NKh editions starting in 1976 simultaneously omitted this table and began to include data on producer goods in current prices and on fixed capital stock in constant 1973 prices.

It is possible to fill the information gap for 1973-1975 by continuing the growth trend for the percentage of fixed capital in the total value of producer goods established during the 1970-1972 period in constant prices. The derived MBMW index can be used to convert data on fixed capital from constant to current prices. To test the results, it is necessary to compare the trend in the percentage share of fixed capital in the total production of industrial producer goods for the 1970-1975 period with that established during the post-1975 period. Estimation results presented in Table 3A indicate that the margin of error must be below 0.3 billion. The reported data on the industrial production is also divided into fixed capital engaged in production of producer and consumer goods. Data in current prices for the pre-1975 period can be obtained using the same approach proposed above.

A similar conversion from constant to current prices for the pre-1975 period must be performed for industrial consumer goods. The NKh table contains the following categories of consumer goods: light, food, fuel and power, machines and equipment, chemical, pharmaceutical, wood and paper products, furniture,

construction materials, glass and china. The residual which can be found as the difference between the total for heavy industry and listed components equals the sum of industrial GVOs of sectors producing ferrous and non-ferrous metals for consumption, toys, jewelry, musical instruments, books and other printing materials, sporting goods, metal dishware, water supply services, laundry and cleaning and other sectors that are insignificant in size. This residual together with pharmaceutical products and glass and china forms the n.e.c. sectors.

The NKh table on consumer goods also contains an entry called "cultural-everyday items." Categories of goods included in this entry can be found in a table on retail trade and in the NKh table devoted exclusively to these goods--which includes all consumer goods for private use produced in the MBMW and chemical sectors, rugs, paper products, furniture and goods produced in the n.e.c., except for pharmaceuticals.¹⁹ Data on chemical goods, furniture and paper products can be obtained from this table, while data on pharmaceuticals is regularly published in the NKh table on the production of consumer goods. Rutgeizer (1975) published a table on the structure of material outlays in science and administration.²⁰ Using this table and NKh data on these outlays, one can obtain the value of metals used in science and administration. Data on purchases of library books and other education materials can be found in the budgetary statistical coverage of outlays on education. A number of other products are apparently produced for public rather than private use. Due to their small size, no information can be found on their production. It is assumed here that their cumulative value did not exceed 0.2 billion rubles during most of the 1970's. The above estimates make it possible to derive the sum of machines and equipment for private use and rugs as a residual.

This author found it impossible to estimate the value of domestically produced rugs using the NKh table on retail trade because of the absence of data on imports and the turnover tax. Neither could this author use the NKh table on the industrial production of consumer goods which includes the total for light industry and several categories of light industrial goods. The residual equals the sum of the values of produced rubber and other non-leather footwear, rugs, and other products, on which no data is available. The researcher is thus left with no other choice but to estimate approximately the value of produced rugs for 1970 and divide this value by the number of square meters of produced rugs. This will first yield the value of one million square meters of produced rugs in 1970 prices and then the total value of produced rugs for all years of the observed period in 1970 prices. The price index for rugs is probably somewhat higher than the average price index for the light industry derived above. The retail value for 1970 was 0.5 billion, of which 0.3 billion is assumed to be the value in producer prices for 30.3 million square meters. The price of one million square meters hence equaled around 0.01 billion rubles.²¹ The derived data on rugs makes it possible to estimate the value of machines and equipment for personal use. This value in turn can be subtracted from the total value of machines and equipment for non-production use to estimate their public use.

The derived values of industrial consumer goods in producer prices is subtracted from the GVOs of industrial sectors to determine the values of producer goods by sector. The division of producer goods into working capital and additions of fixed capital is complicated by the fact that the authors of the official statistics use the Marxist concepts of "subjects of labor" and "means of

labor" to distinguish industrial producer goods. While "subjects of labor" are completely used up during the production process, "means of labor" are used during more than one production cycle. The concept of fixed capital that is applied in other sections of the official statistics covering capital investment hence differs from the concept of "means of labor" by the value of all cheap durables and spare parts as well as by the value of capital repair works.

3.5 AGRICULTURAL PRODUCTION

3.5.1 State, Collective and Private Production

Planners estimate three types of agricultural prices: procurement, factor cost and "collective" (village) market.²² They set procurement prices on agricultural commodities sold to state and cooperative procurement agencies, to private producers by state farms, to the armed forces and industrial enterprises by subsidiary state farms, as well as on commodities distributed to farmers as wage substitutes. Factor cost prices are used to quantify non-commodity produce of the public sector that is not exchanged for money. Finally, average ex-village and in-village market prices determine the value of agricultural commodities that collectives and private producers sell to households and service organizations. Planners evaluate the non-commodity end product of private producers by the method of averaging out procurement and village prices. They evaluate the intermediate product of private producers in factor cost prices established at state and collective farms.

The NKh regularly contains information on the agricultural GVO in current and constant prices. 1965 prices functioned during 1970-1975 and 1973 prices--after 1975. The NKh also includes data on the agricultural GVO of collective and large state farms in constant prices as well as on growth rates for state, collective and private agricultural sectors with 1965 and 1970 as base years. The reason why TSU officials refuse to publish data on the GVO of small state farms is that they want to conceal the agricultural GVO of private producers, data on which can be used for estimating consumption-in-kind and eventually the entire civilian consumption component of national income. Data on the GVO of small state farms is hence essential for deciphering the TSU secret code in this area.

Before the publication of Semenov's informative work on agricultural finances, the task of estimating the agricultural GVO of private producers with the required precision was probably impossible. In his work Semenov revealed the cumulative GVO of the public sector for 1965, 1970 and 1975-1980 in 1973 prices.²³ Combining Semenov's and NKh data leads to the GVOs of small state and private farms for the above years in 1973 prices. The GVO of small state farms increased from 3.4 billion in 1965 to 4.0 billion in 1970, decreased to 3.5 billion in 1975 and increased again to 4.2 billion in 1980. Relatively small fluctuations in the size of this GVO and its percentage share in the GVO of the entire public sector make it possible to fill the information gap for 1971-1974 and for 1981-1983 in 1973 prices. The derived results indicate the same growth rates for the private sector as those listed in the NKh.

The existence of different price policies in public and private agricultural sectors requires the computation of two agricultural price indexes for converting the GVOs of these sectors from constant to current prices. In 1965, the GVOs of collective and large state farms equaled 35.5 and 20.6 billion as measured in 1973 prices. As listed in the NKh for 1974, these GVOs equaled 29.0 and 16.9 billion in 1965 prices. A 1973/1965 price ratio for the public sector is estimated as follows: $1.22 = (35.5+20.6):(29.0+16.9)$. In 1973, the total agricultural GVO equaled 121.9 billion in current prices and 97.9 billion in 1965 prices, which presupposes a price ratio of $1.245 = 121.9:97.9$. The ratio between public and private agricultural sectors is approximately 3 to 1 in constant prices. If one assumes that x is the price index in private agriculture, then $1.245 = (3*1.222+x):4$ and $x = 1.31$. The price index in private agriculture is therefore 5 percent higher than the general agricultural price index. This can be explained by the fact that village prices grow much faster than procurement prices.

3.5.2 Commodity and Non-Commodity Output

The NKh includes the following relevant information on the agricultural production: the procurement value of goods purchased from state, collective and private farms; the structure of fixed capital of the public agricultural sector; the value of fixed stock and inventories of large state and collective farms; the amount in physical units of different types of livestock in all farms, including private; the structure of commodity-type produce sold by all farms in percentage terms; and the volume of ex-village market sales in market and state prices. All of the above data are based on values in current rubles.

The first estimation step entails the disaggregation of the GVO of state, collective and private farms into commodity and non-commodity produce. To complete this step it is necessary to convert the NKh data on the total commodity produce from percentage to value terms. This NKh data is based on the official statistical practice of comparing the agricultural output in state rather than ex-village market prices as well as excluding food packages and in-village market sales from the official total for the commodity output.²⁴

In 1975, state, collective and private farms respectively sold 42, 45, and 13 percent of the total official commodity output. The combined sales of collective and private farms to state and cooperative agencies equaled 40.4 billion. Data on the volume of ex-village market sales in state prices (2.8 billion) can be derived using the NKh table on the structure of retail trade. The official total for the agricultural commodity can be estimated as 74.5 billion $(40.4+2.8):(45+.13)$. The same procedure can be repeated for other years. The margin of error depends on the extent to which the absence of a decimal point in the NKh data distorts the results.

Starting in 1981 NKh edition began to publish data on sales to state and cooperative agencies in such a way that makes it possible to estimate sales by private producers. In 1975, total sales equaled 69.5 billion, while sales by state and collective farms equaled 61.8 billion. The difference between these two numbers (7.7 billion) amounts to sales by private producers. The official total for their commodity output equals 9.7 billion $(74.5*13)$, while the output of their ex-village market sales in state prices -- 2.0 billion $(9.7-7.7)$, which amounted to around 70

percent of all such sales. The same sales in market prices equaled 5.2 billion, of which 3.7 billion were sales by private producers. Households also sell livestock to collective farms at in-village markets in the amount of around 0.8-1.0 billion. Because 1975 was a bad year for agriculture it will be assumed here that the value of sold livestock was around 0.8 billion. The total commodity output of private producers hence equaled 12.2 billion ($7.7+3.7+0.8$).

The non-commodity output of private producers can be estimated as the difference between their total and commodity output. Their non-commodity output consists of agricultural materials, consumption-in-kind and gross investment into gardening and livestock. The sum of produced and purchased materials can be estimated as a percentage share of the total output. According to Soviet sources, this share increased from 20 to 30 percent during the 1970s.²⁵ Kuznetsova (1984) reports that outlays on transportation and veterinarian services comprise around 17 percent, while outlays on feed produced by state and collective farms--20 percent of the total material outlays of the private agricultural production.²⁶ Materials produced on private farms thus comprise the remaining 63 percent. The difference between the total output and material outlays equals the end product of private producers. Gross investment by private producers is estimated by establishing the ratio between gardening and livestock (both young and productive) in private farms on the one hand and state and collective farms on the other. Consumption-in-kind is determined as the difference between the end product and the sum of gross investment and ex-village market sales.

In 1975, the commodity output of state farms equaled 31.3 billion ($74.5^*.42$), while their sales to state and cooperative agencies equaled 29.1 billion. Their other commodity output of 2.2 billion ($31.3-29.1$) consists of retail sales of agricultural materials to private producers, ex-village market sales, as well as sales to organizations that administer small state farms. There is no data on the volume of these particular sales nor on the way they are registered in trade statistics. The commodity output of collectives equaled 33.5 billion ($74.5^*.45$), while their sales to state and cooperative agencies equaled 32.7 billion. Their ex-village market sales equaled 0.8 billion in state prices and 1.5 billion in market prices.

The total commodity output of state and collective farms also includes wage substitutes and in-village market sales. Wage substitutes comprise around 6 percent of collective farmers' wages earned from agricultural activities.²⁷ While these wages equaled 15.2 billion in 1975, non-monetary wages were around 0.8 billion. State farms are assumed to pay no more than 0.2 billion in non-monetary wages.²⁸ Agricultural materials used in private production comprise around 20 percent of non-monetary wages while consumption-in-kind equaled the remaining 80 percent. In addition, it must be assumed that private producers sell primarily their own output at ex-village markets. Private producers spend around 1.2 billion on purchases of production materials and livestock, of which around 0.6 billion is spent in state stores and around 0.6 billion spent at in-village markets.²⁹

The non-commodity output of state and collective farms equals the difference between their total and commodity output. This difference consists of agricultural materials used during the current production year and stored as inventories, additions to young livestock, and additions of agricultural fixed

capital (livestock and gardening). The value of agricultural materials is estimated using both the input-output data and NKh tables on the structure of production outlays in collective and large state farms. This table contains the average data for the entire period of 1976-1980 as well as annual data for 1982-1984. While the estimation of agricultural materials is performed in the next section dealing with material outlays, additions to agricultural fixed capital and inventories in working table 3B3. The derived non-commodity output serves as a control total.

3.5.3 Producer and Consumer Goods

The authors of the official statistics always omit data on the division of agricultural production into producer and consumer goods because it facilitates the estimation of agricultural goods by end use. One evident excuse for such an omission is that while all industrial enterprises are required to submit monthly reports on the division of their production into categories "A" and "B," no such organized collection of information exists in the agricultural sector.³⁰ Instead, planners working in the unified agricultural sections of the USSR Gosplan and TSU are required to make cumbersome calculations themselves. Planners are unable to rely on preliminary estimates as in the case of the industrial sector because of their lack of control over consumption-in-kind and ex-village market sales by private agricultural producers. Since planners refuse to reveal the results of their annual estimations, the researcher has no other alternative but to divide the agricultural output into Department I and II using purchasers' rather than producers' prices.

In 1972, the total value of consumer agricultural goods (29.1 billion) consisted of: consumption-in-kind (13.1 billion); ex-village market sales (4.6 billion); retail sales of fruits, vegetables and eggs by state-cooperative trade organizations (7.9 billion); meats purchased by cooperatives from private producers (0.3 billion); food packages (0.7 billion); and a surcharge by dining organizations (0.3 billion). The remaining amount of 2.2 billion is assumed to be the difference between 1) planned losses of agricultural materials and fixed capital and 2) additions to grain reserves. The national income statistics can be used to estimate planned losses (3.5 billion). Additions to grain serves hence equaled -1.3 billion.

The above figures represent the end use of goods. In order to estimate the production of agricultural consumer goods, it is necessary to determine the value of imports, taxes and distribution cost. Imports equaled 0.6 billion, subsidies on fruits and vegetables were 0.3 billion, retail trade surcharge were 0.7 billion, and transportation cost equaled 0.6 billion.³¹ The agricultural output in producer prices then equalled 27.4 billion ($29.1 - 0.6 + 0.2 - 0.7 - 0.6$), of which commodity produce equalled 13.6 billion ($27.4 - 13.8$).

There is a sufficient data base to repeat the above estimation procedure for other years. The precision of results depends on the extent to which the derived data on consumption-in-kind approximates planners' own data. CIA analysts rely on the official agricultural data reported in physical units and arrive at results which significantly exceed those derived above. In this author's opinion, the Soviet price policy in the area of agriculture is so complicated that it is practically impossible to convert the official data from physical to value terms

with any precision. What further complicates this conversion procedure is the absence of profit in prices on privately produced goods. In contrast, the procedure proposed above is based entirely on data in value terms. The only areas of uncertainty are precise annual fluctuations in the ratio between the net and total output of private producers and their gross investment. In an attempt to evaluate the margin of error resulting from this uncertainty, one can compare data derived in the present section with the official data on household budgets. Such a comparison is made in Section 7.

3.6. CAPITAL CONSTRUCTION

3.6.1. Data Base

NKh editions cover capital works performed in state, cooperative, collective and private sectors in the section misleadingly called "capital construction." The latter includes not only construction works but also investment into machinery and equipment and gardening. This NKh section also includes data on additions of capital and the price index for production outlays of the construction-assembly sector. At the same time, this NKh section excludes capital repair works performed by subsidiary construction enterprises and individuals as well as unfinished production. Except for data on unfinished construction in the state-cooperative sector reported in current prices, all data on capital investment and repair works is presented in constant January 1969 prices. In 1976, planners introduced a deflationary coefficient that reduced the price index by 0.9². This fact can be established by comparing the value of construction assembly works reported for 1970 in NKh editions before and after 1976.

Data on the construction GVO in current prices is reported in the NKh table on the GSP by sector, and data on unfinished production is reported in the NKh table on the structure of inventories which has been excluded from NKh editions since 1981.³² Data on capital repair in current prices is reported only for All-Republic budgets. The researcher must independently apply repair rates to the value of buildings and installations to derive capital repair works for profit-seeking and non-budgetary housing sectors. The NKh table on capital depreciation of profit-seeking sectors includes an entry for capital repair works performed by both construction and MBMW enterprises.

3.6.2 Components of the Construction GVO and Price Index

Planners estimate the construction GVO by adding the value of performed construction-assembly, capital repair, oil and gas exploration, and construction-design works as well as various expenditures connected with capital construction. Construction-assembly works are divided into those paid by organizations that finance capital investment and those paid by construction enterprises often by means of budgetary and credit assistance. Planners refer to construction-assembly works that are excluded from the category of capital investment as "additions to unfinished production in the construction sector," which they classify as additions to inventories similarly to unfinished industrial and agricultural production.³³ Planners exclude those design and exploration works that are not financed under the category of capital investment from the construction GVO. Moreover, planners

treat these types of works as scientific services which are outside material production.³⁴

Unfinished production should not be confused with unfinished construction-assembly and capital repair works. CIA analysts unjustifiably ignore unfinished production when they compare the NKh data on construction GVO, which is reported in current prices, with capital works financed as capital investment, which is reported in constant prices.³⁵ In addition, these analysts underestimate the value of capital repair works. As a result, these analysts significantly overestimate capital investment in current rubles, which they derive as the difference between the construction GVO and the value of capital repair works. They thus propose the price index that is overly inflated. This fact can be ascertained by comparing the independently derived additions of fixed capital with those listed in NKh editions before 1976 in the table called "the accumulation fund of national income." The independent estimates presented in Section 4 are based on subtracting the value of replaced capital from total additions to capital stock.

There is another reason why the results proposed by CIA analysts invite criticism. Their results are based on the assumption that the comparison between capital investment in current and constant prices leads to the price index for all years of the observed period. The author of the present study initially made the same assumption and arrived at the price index that seemed to decline unrealistically between 1971-1972 from 1.03 to 0.96, defying all norms of Soviet planning as well as contradicting Soviet authors' complaints about inflation in the construction sector.³⁶ Since TSU estimates are less reliable in constant prices than in current prices, the observed fluctuations suggest two initial hypotheses: TSU officials either overestimated capital investment in constant prices beginning in 1972 or underestimated it before 1972. The way to test which of these hypotheses leads to correct results is to use published data on capital investment in constant prices for estimating investment write-offs.

Investment write-offs, which are treated as planned losses of the construction sector in national income accounts, equal the difference between capital investment and the sum of installed capital and additions to unfinished construction.³⁷ As discussed below, investment write-offs can be estimated in this way for every year of the observed period. Estimated in this way, investment write-offs amounted to -0.4 and -0.8 billion rubles in 1970-1971 and averaged 2.0-2.5 billion rubles after 1971. As estimated in Section 6, the sum of planned losses in agriculture and construction fluctuated between 3.0 and 5.0 billion rubles during the 1970s. Given the fact that the value of losses (investment write-offs) always exceeds 0, the second hypothesis appears more valid than the first one. If one assumes that investment write-offs equaled 1.5-2.0 billion rubles in 1970-1971, then it follows that TSU officials underestimated capital investment in constant prices by around 2.0-2.5 billion rubles and that the price index approached 1.00 in 1970-1971.

It would be premature, however, to assume that the derived ratio between capital investment in current and constant prices was supposed to fluctuate from 1.00 to 0.96 between 1971-1972. For example, the officially published index declined by 0.006 from 0.994 to 0.988. Similarly, the derived index jumps from

1.00 to 1.04 during 1982 when the officially published index remains flat at 0.993-0.994. This evident discontinuity leads to the observation that planners changed their method of compiling the construction GVO in 1972 and then returned to their old method in 1982. The change made the comparison of capital investment in current and constant prices no longer valid for the decade of 1972-1981. This observation is confirmed by the analysis of investment trends presented in the next section for 1965-1975.

There is a sufficient data base to demonstrate that during 1965-1971 planners consistently excluded a certain part of completed capital works from net fixed investment into production and service sectors. It is assumed here that these "excessive" capital works represent construction of installations that can only serve the military and thus cannot be considered as net fixed investment into production and service sectors. In 1972, planners found a better way of concealing defense construction. The independently estimated net fixed investment for the period 1972-1975 equals planners' estimates presented in the NKh table on the accumulation fund of national income. In contrast, the results derived for the pre-1972 period exceed planners' estimates by 2.0-2.7 billion rubles even after taking into account the actual amount of investment write-offs and significant replacement of capital that took place in 1971.

The obvious change in planners' method of compiling the construction GVO that caused discontinuity in the price index was that the derived capital investment in current rubles ceased containing defense construction in 1972. There are two possible methods of concealment: 1) defense construction can be excluded from the construction GVO altogether similarly to exploration and design works financed from the state budget, or 2) defense construction can be hidden together with additions to unfinished production, which are known to be financed to a great extent from the state budget.³⁸

The conclusion reached in Section 4 using the process of elimination suggests that planners chose the second method. The explosive growth of unfinished production after 1971 corroborates this conclusion. Such an explosive growth also caught attention of Igor Birman in his study of factors influencing Soviet economic growth and productivity.³⁹ His analysis, however, differs from that presented here. He believes that planners manipulated data with respect to unfinished production to create an image of larger growth rates, especially during "bad" years for the Soviet economy. There is a general agreement among Western economists that Soviet production statistics in current rubles are quite accurate and that planners' manipulations with production statistics affect the size of sub-totals rather than totals. Thus, it seems quite unlikely that planners would artificially increase one component of the construction GVO without decreasing another component. In this light, the proposed explanation for the explosive growth of unfinished production can be seen as an attempt to refine Birman's argument.

3.6.3 Estimation Procedure

Price index. The estimation procedure is demonstrated here for 1970, 1973 and 1982--the years during which changes in planning methodology can be observed. In 1973, the construction GVO and additions to unfinished production equaled 80.9 and 4.4 billion rubles in current prices. As estimated in the next

section, capital repair works equaled 11.3 billion rubles in current prices. Capital investment hence equaled 65.2 billion rubles (80.9-4.4-11.3) in 1973. Using the same procedure leads to capital investment in current prices in the amount of 58.5 billion rubles for 1970 and 91.1 billion rubles for 1982.

Capital investment and additions to capital in constant prices equaled 82.0 and 77.7 billion rubles in 1970, 98.7 and 94.4 billion rubles in 1973, and 143.8 and 139.5 billion rubles in 1982. The sum of unfinished construction and investment write-offs hence equaled 4.3 billion rubles for all of the above years. For the collective sector this sum equaled 0.6, 0.5 and -0.1 billion rubles. Unfinished construction comprises most of this sum. Additions of unfinished construction of the state-cooperative sector equaled 3.9, 1.9 and 0.9 billion rubles in current prices and 4.1, 2.0, and 0.9 billion rubles in constant prices. Total additions to unfinished construction then equaled 4.7, 2.5 and 0.8 billion rubles, while investment write-offs in constant prices equaled -0.4, 1.8, and 3.4 billion rubles for 1970, 1973 and 1982 respectively.

Capital investment registered as part of the construction GVO is estimated as the difference between total investment and the sum of investment into machines and equipment and gardening. This sum equaled 25.7 (25.3+0.4), 31.6 (31.1+0.5) and 56.7 (55.9+0.8) billion rubles, while construction works equaled 56.3, 67.1 and 87.1 billion rubles for 1970, 1973 and 1982 respectively--all in constant prices. If one accounts for investment write-offs, then construction works equaled 58.5 (56.3+2.2) billion rubles in 1970. The ratio between construction works in current and constant prices equaled 1.00, 0.97 and 1.04 for 1970, 1973 and 1982 respectively. If one takes into account "excessive" capital outlays for 1970 in the amount of 2.7 billion rubles that are derived in Section 4, then the real price index must be reduced from 1.00 to 0.95. During 1980-1981 the derived price index equaled 1.00 where it should have remained in 1982. The value of "excessive" capital outlays then can be estimated in the following way for 1982: 4.0 billion rubles = $91.1 - 87.1 \cdot 1.00$.

Producer and Consumer Goods. The division of the GSP into producer and consumer goods is less problematic in the construction sector than in other sectors because producers' and purchasers' prices on the construction output are the same. All completed works and expenditures on installing fixed capital outside the civilian production sectors are registered as part of Department II. Uncompleted assembly and repair works on fixed capital that will be employed for non-productive purposes are registered as producer goods because these works presently remain within the production sphere.

In contrast to their coverage of industrial goods, the authors of the official statistics conceal capital investment into the defense industry together with that into service sectors. In addition, the authors of the official statistics treat the entire capital investment into transportation and communication (T&C) sectors as productive even though a substantial part of T&C activities is non-productive. They can justify their policy by the fact that their methodology of data collection is not designed to make a distinction between such activities on a regular basis and that central planners must make special calculations in this regard. However, the official policy is quite convenient for concealing the total depreciation of and net investment into productive capital. Only once did the

authors of the official statistics reveal the size of productive T&C capital in connection with the 1972 input-output table of the fixed capital stock. Using this and other NKh tables, it is possible to estimate the ratio between productive and non-productive T&C capital equaled 60:40.⁴⁰ This ratio is assumed here to remain unchanged throughout the observed period.

Data on total capital investment into production and non-production sectors can be found in CEMA publications. The latter also include data on the structure of capital investment into industry, agriculture and T&C as well as on the value of total capital investment into trade and distribution (T&D) sectors. In contrast, NKh editions conceal this value in the total for a group of service sectors. Data on the structure of capital investment into production sectors is unavailable for the construction and T&D sectors. This data can be derived with an insignificant margin of error by analyzing the NKh data on the structure of fixed capital in these sectors. While machinery and equipment comprise most of capital investment into the construction industry, assembly works comprise most of investment into the T&D sectors. The structure of capital investment into non-productive sectors is determined by means of comparing the structure of investment for the entire economy and for production sectors. This approach makes it possible to estimate capital investment into defense industry which is hidden together with that into civilian and military administrations. All these calculations are made in Section 6 of this study.

The disaggregation of capital repair works into Department I and II that is performed in Section 4 is based on combining the NKh and budgetary data and secondary Soviet sources on capital repair rates. Total capital repair works performed in the housing sector are estimated by combining the NKh data on fixed capital and secondary Soviet sources on capital repair rates in this sector. The estimation results indicate that most financing of capital repair in this sectors is implemented through the All-Republic budget. The value of capital repair works performed in the private and cooperative housing and in the science sector is determined by combining data on capital repair rates and data on the value of these sectors' capital stocks listed in Rutgaizer (1975). Construction repair works performed in the defense production sector are estimated together with those performed in the administration sector as a residual for the period ending in 1975 and by continuing the trend after 1975. It is assumed here that no capital repair works are performed on defense installations since these are excluded from capital stock.

Sectors of Capital Ownership. Planners divide construction activities into state, cooperative, collective and private production sectors. It is necessary to follow planning practices in this area for the purpose of establishing all sources of financing capital works. The NKh regularly includes tables on capital investment of state-cooperative, collective and private sectors; on construction works performed by state-cooperative enterprises on the one hand and by the entire public sector on the other; as well as on main repair works. TSU officials treat joint construction ventures of state and collective farms as part of the cooperative sector, which also includes cooperative housing construction financed by households. The size of capital repair works performed by collective farms is quite insignificant--0.1 - 0.2 billion rubles. In 1983, TSU officials began to publish data

on the cooperative housing construction. Data on this construction for the earlier period can be found in secondary Soviet sources, such as Sverdlik (1981).⁴¹

The total household financing of capital works also includes payments to state enterprises which build and repair houses and flats owned by the state and cooperatives. While private agricultural producers own a relatively large size of production facilities, nothing is known about the means of their construction. It is assumed here that most private construction activities take place in the housing sector and that the above facilities are built primarily by subsidiary construction enterprises administered by state and collective farms. The construction GVO of the private sector hence equals the difference between capital investment and repair initiated by individuals and their payments to the above enterprise. Similarly, the construction GVO of the collective sector equals the difference between all capital works performed in collective farms and those performed by joint construction ventures.

3.7 OTHER PRODUCTION ACTIVITIES

3.7.1 Transportation and Communication (T&C)

The NKh table on the GSP by sector regularly includes data on the combined GVO of T&C sectors. The GVO of T&C sectors that are not engaged in the delivery of producer and consumer goods is excluded from this NKh table. In contrast, the NKh tables on communication services, T&C employees, their wages, profit, depreciation, fixed and working capital contain data on both productive and nonproductive T&C sectors. The additional information on these sectors' output in value terms can be found in NKh editions for the period ending in 1975 which includes a table on factor cost measured with 10 kopecks per 10 ton-kilometers (t/k) and per 10 passenger-kilometers (t/p).

In order to disaggregate the combined GVO of productive T&C sectors, one can arbitrarily assume that the ratio between the output of productive and nonproductive communication sectors is around 55:45. The margin of error is quite insignificant because the entire output of communication sectors reached only 6.8 billion rubles in 1981. The fact that this ratio is more than 1 is confirmed indirectly by the existing evidence on the number of employees in communication sectors.⁴² The proposed assumption leads to the ratio between the GVOs of productive T&C sectors that is similar to the ratio between the values of fixed capital employed in these sectors (around 13:1).⁴³

The information on the transportation GVO is useful for determining these sectors' price index because TSU officials never reveal the price of tariffs for transporting cargos per 10 t/k. Thus, this price in current rubles equals the ratio between the total GVO and a total number of t/k that is regularly reported in the NKh for major t sectors. The annual change in this ratio can serve as a reliable substitute for the general price index but not for specific indexes estimated in each transportation sector. During the 1970s one observes a relative decrease in the role of railroads and a relative increase in the role of pipelines. Between 1970 and 1980 the percentage share of railroads in total t/k changed from 66 to 55 percent, while that of pipelines changed from 7 to 19 percent, that of sea

and river fleets changed from 22 to 20 percent, and that of automotive transportation changed from 6 to 7 percent.

Between 1970 and 1975 the factor cost per 10 t/k changed in the following way: for the entire economy, from 5.3 to 5.5; for railroads, from 2.3 to 2.5; for sea fleet, from 1.5 to 2.0; for river fleet, from 2.5 to 2.6; for automobiles, from 57.1 to 50.5; and for pipelines from 0.96 to 0.73. The total factor cost is estimated as a difference between the total GVO and the net profit earned from productive activities. This net profit is calculated in Section 5 as a difference between the PNI and the sum of labor outlays and deductions on the road construction. The total factor cost increased from 20.3 to 28.5 billion between 1970 and 1975. For railroads it increased from 5.8 to 8.1 billion; for sea fleet, from 1.0 to 1.5 billion; for river fleet, from 0.4 to 0.6 billion; for automobiles, from 12.6 to 17.2 billion; and for pipelines, from 0.3 to 0.6 billion. Determined as a residual, the factor cost for freight airlines and fishing fleet increased from 0.2 to 0.4 billion rubles.

As evident from the above results, railroads and the automotive transportation comprise around 90 percent of transportation charge in value terms. Data on the factor cost per sector can be derived with an insignificant margin of error providing the availability of information on changes in per unit charges in the railroad sector. Data published in Kolesov (1982) indicates that these per unit charges increased steadily by 0.5 kopecks a year between 1969 and 1975.⁴⁴ It can be assumed that the same trend continued till 1981. It also can be assumed that 1982 price reforms resulted in the proportional increase of per unit charges in all transportation sectors.

The NKh regularly includes a table on the net profit earned by railroads, sea and river fleets, and automotive transportation. Kolesov (1982) provided information on the ratio between service and freight activities in each transportation sector.⁴⁵ His and NKh data are combined with the results derived in Section 5 on the total net profit included in the transportation PNI to estimate the net profit of each productive transportation sector. The GVOs of these sectors then can be determined as a sum of factor cost and net profit. Ratios between GVOs and t/k are assumed here to represent annual service charges, while changes in these ratios -- price indexes of transportation sectors. The derived GVOs of transportation sectors in current and constant prices are useful for estimating price indexes for the end use of industrial and agricultural goods in purchasers prices.

Data on T&C services performed in delivering particular goods is published only in connection with 1959, 1966, and 1972 input-output tables. The available input-output data indicates, however, that the structure of these services has changed insignificantly when it is analyzed with respect to 17 aggregated sectors. In 1972, the cost of transporting fuels and construction materials comprized almost 40 percent of the entire T&C GVO, while that of metal, MBMW, and wood products--around 10 percent each. In order to reduce the margin of error this author decided to accept the average of two sets of results derived using two independent estimation methods. These methods are based on continuing the established trends for 1) the structure of the entire T&C cost and 2) ratios between the T&C cost and the GVO for each industrial sector estimated in constant producers' prices that exclude the turnover tax. For the agricultural sector, this

author used the amount of total purchases by procurement and trade organizations estimated in constant prices.

Data on t/k of different types of transported goods is available only for railroads. The NKh regularly includes such data for fuels (coal, petroleum, and coke), ores and ferrous metals, wood products, mineral construction materials, mineral fertilizers, crops, and the unidentified residual. The latter accounts for 25 percent of the total freight services performed by railroads. The residual includes other fuels, non-ferrous metals, other construction materials, other chemicals, other agricultural products, machines and equipment, and various consumer goods.

The published input-output data makes it possible to estimate ratios between the value of identified and other products in fuels, metallurgy, construction materials, chemicals and agricultural sectors. The derived ratios in turn allow one to determine total railroad services performed in delivering these sectors' goods. The same approach can be employed to estimate the value of services performed by sea fleet. The NKh table on the activities of the Soviet sea fleet has a wider coverage than the table on railroads by including data on chemicals and MBMW products. The cost of delivering fuels can be alternatively estimated as the sum of railroad, sea line and pipeline services. Automotive transport of particular goods can be determined as residuals. All of the above estimations are completed here in both current and constant prices.

3.7.2 Trade and Distribution (T&D) and Other Production Sectors

T&D sectors include the retail and wholesale domestic trade, foreign trade, social dining, material-technological supply and sale, and procurement. The T&D GVO includes outlays and the net profit of foreign trade organizations, while the balance of imports and exports is concealed together with the GVO of other production sectors. Imports and exports stand for net revenues earned by the entire economy rather than by foreign trade organizations. CEMA publications include data on the cumulative PNI of the entire T&D sector. Its GVO thus can be estimated as the sum of the PNI, material and depreciation outlays. These outlays are first determined cumulatively for T&D and other production sectors as the difference between the cumulative GVO and PNI of these sectors that are regularly published in the NKh. These outlays are then disaggregated using the input-output data, whose extrapolation for the post-1972 period is justified by the fact that these outlays changed insignificantly every year during 1959-1972.

The NKh includes data on outlays and net profit of all trade sectors and on the structure of outlays of the retail trade and dining sectors. According to Gosplan instructions, the cost of transportation services is excluded from the trade GVO so as to avoid the double counting of these services.⁴⁶ It is assumed here that the ratio between the transportation cost and total outlays (16-17 percent) is the same in both the retail and wholesale trade sectors. The margin of error is insignificant because the total outlays of the wholesale trade sector remained below 2.0 billion. This assumption makes it possible to estimate total outlays of the domestic trade sector included in the trade GVO. The latter can be estimated as the sum of outlays, the net profit and movie tax which is estimated using data by Rutgaizer (1975).

Data on total outlays of supply and sale organizations can be found in Vestnik Statistiki for the period ending in 1975. For the period ending in 1975 the GVO of these sectors is estimated as the sum of outlays and the net profit. For the post-1975 period this GVO is estimated as a residual after accounting for the GVO of trade and procurement sectors. In turn, the GVO of procurement sectors is estimated as a residual for the pre-1976 period. It is determined as the difference between the total T&D charge in agriculture and the charge of trade and dining organizations for selling agricultural produce. The latter is assumed here to comprise the same part of total T&C and T&D charge for agricultural produce that is reported in the NKh throughout the observed period.

The derived T&D GVO must be in turn divided according to their servicing of particular industries. In order to simplify computations it is assumed here that trade organizations have an exclusive right to serve consumer industries. Moreover, their sale surcharges are assumed to be proportional to the trade turnover of these goods. The trade surcharge on MBMW and chemical products and construction materials is then determined as the difference between the total trade GVO and the cumulative trade surcharge on light, food and n.e.c. products. Using the input-output data it is thus possible to estimate the supply and sale cost for each heavy industrial sector as a residual for 1972. Results derived for that year can be extrapolated for other years with an insignificant margin of error due to the relatively small size of the supply and sale GVO.

As in the case of T&D sectors, the GVO of other production sectors can be estimated as the sum of the PNI and material and depreciation outlays. According to the published input-output data, material depreciation outlays of these sectors equaled 0.8 billion in 1966 and 1.1 billion in 1972. It is assumed here that such an insignificant increase also applies to the post-1972 period. Other production activities take place in state and private sectors. Using data published in Sorokin (1977) it is possible to demonstrate that the officially registered output of private producers reached only 0.3 billion in 1972.⁴⁷ All of this output constitutes net revenues for private producers. The PNI of the state sector is determined separately for forestry and other domestic production sectors in Part III of this study. The derived residual equals net revenues from foreign trade activities.

The division of the T&D and other production sectors' GVO into Department I and II is based on the analysis provided by Zalkind (1976).⁴⁸ The GVO of T&D sectors is divided proportionally to the value of producer and consumer goods sold by these sectors. Producer goods of other production sectors consists of purchased first copies of movies and records, scrap and forestry products by industrial sectors as well as additions of unfinished forestry production. Consumer goods includes forestry works performed for service sectors and the output of publishing houses. While producer goods are estimated as part of material outlays, consumer goods--as part of retail trade purchases and material outlays of service sectors.

Due to the lack of data, price indexes of T&D and other production sectors cannot be estimated with the same precision as those of industrial, agricultural, construction and T&C sectors. Planners treat the price index of T&D services as changes in the ratio between these services estimated in current prices and the turnover of goods in physical units. It is the insufficient official coverage

of supplied goods in physical units that prohibits the duplication of planners' approach in this area. The best approximation of the T&D price index appears to be the ratio between the growth of T&D services in current prices and the growth of supplied consumer and producer goods in constant producers' prices. The price index for other production sectors is assumed here to approximate the average index of industrial and agricultural sectors.

END NOTES

- ¹ See P. Fedoseev, ed., *Sootnoshenie Dvukh Podrazdeleniy Obshchestvennogo Proizvodstva*, (Moscow: Nauka, 2nd edition, 1983), pp. 21 - 29.
- ² Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), pp 252 - 255.
- ³ L. Gol'denberg, and V. Petrov, "Raschot I i II Podrazdeleniy i Stoimosti Struktury Obshchestvennogo Produkta," *Vestnik Statistiki*, No. 9, 1983, p. 31.
- ⁴ Some procured agricultural raw materials that are used for reserve purposes may be included in Department II. See Gosplan (1974), pp. 201 - 202, for the discussion of commodity and noncommodity production.
- ⁵ A. Zalkind, ed., *Dva Podrazdeleniya Obshchestvennogo Produkta*, (Moscow: Statistika, 1976), pp. 163 - 164.
- ⁶ Gosplan, (1974), pp. 67 - 68.
- ⁷ This list is based on combining lists of industrial sectors that were published in Gosplan (1974), p. 704, and L. Gol'denberg, "Voprosy Razrabotki Mezhotraslevykh Svyazey v Promyshlennosti," *Vestnik Statistiki*, No. 12, 1980, pp 23 - 24. and NKh editions. In input-output tables planners combine construction materials and glass sectors but disaggregate fuels sector into petroleum and gas, coal and other.
- ⁸ Gosplan (1974), p. 725.
- ⁹ A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov*, (Moscow: Finansy, 1976), and B. Kostinsky, "Gross Values of Output in the 1972 Soviet Input-Output Table," A Working Paper (Washington, D.C.: U.S. Department of Commerce, Bureau of the Census, 1982), p. 10 and pp. 39 - 42.
- ¹⁰ D. Gallik, M. Heinemeier, B. Kostinsky, V. Treml, and A. Tretyakova, *Construction of a 1977 Soviet Input-Output Table*, (Washington, D.C.: U.S. Department of Commerce, 1984).
- ¹¹ P. Kuchkin, and N. Moroz, *Chisty dokhod Sotsialisticheskogo Obshchestva*, (Moscow: Finansy, 1974), p. 91.
- ¹² See Volkov, p. 153, and Kostinsky, pp. 30 - 31.
- ¹³ V. Belkin and A. Geronimus, eds., *Model' Dokhod-Tovary i Balans Narodnogo Khozyaistva*, (Moscow: Nauka, 1978), p. 119.
- ¹⁴ V. Sorokin, *Gruppy "A" i "B" Promyshlennosti*, (Moscow: Ekonomika, 1977), p. 123.
- ¹⁵ M. Bor, *Planovyi Balans Narodnogo Khozyaistva*. (Moscow: Ekonomika, 1977), pp. 110 -111.

¹⁶ Sorokin, p. 124.

¹⁷ This fact can be ascertained by comparing the growth rate of GVOs of light and food industries estimated in producer prices with the growth of the turnover tax collected in these industries. The turnover tax has steadily comprised 21-22 percent of the total purchasers prices on goods produced in these industries.

¹⁸ See Zalkind, p. 119, and Fedoseev, p. 123.

¹⁹ As evident from the NKh coverage of consumer goods, planners exclude pharmaceuticals from "cultural-everyday items".

²⁰ V. Rutgaizer, *Resursy Razvitiya Neproizvodstvennoi Sphery*, (Moscow: Mysl', 1975), p. 168.

²¹ The price index in the rug production sector is assumed to be the same as that of the entire light industrial sector.

²² See Gosplan (1974), pp. 201 - 202.

²³ V. Semenov, *Finansovo-Kreditnyi Mekhanizm v Razvitii Sel'skogo Khozyaistva*, (Moscow: Finansy i Statistika, 1983), p. 96.

²⁴ NKh 1978, p. 586.

²⁵ V. Belyanov, *Lichnoe Podsobnoe Khozyaistvo Pri Sotsializme*, (Moscow: Ekonomika, 1970), p. 101; G. Shmelev, *Lichnoe Podsobnoe Khozyaistvo i Ego Svyazi s Obshchestvennym Proizvodstvom*, (Moscow: Mysl', 1971), pp. 28 - 29; and V. Tikhonov, ed., *Agrarnye Problemy Sotsializma*, (Moscow: Nauka, 1980), p. 499.

²⁶ T. Kuznetsova, "Resursnoe Obespechenie Lichnogo Podsobnogo Khozyaistva," *Voprosy Ekonomiki*, No. 11, 1984, p. 103.

²⁷ U. S. Central Intelligence Agency, *U.S.S.R. Gross National Product Accounts, 1970, Research Aid, A (ER) 75-76*, November 1975, p. 23

²⁸ The payment of nonmonetary wages is much more widespread in collective than in state farms.

²⁹ Figures are based on data reported by Kuznetsova, p. 103, and CIA (1975), pp. 34 - 25.

³⁰ See Zalkind, p. 98.

³¹ See working table 3B2 in Volume II of this study.

³² Data on unfinished production actually can be found in two NKh tables on inventories of the entire state-cooperative and construction sectors. Unfinished production in subsidiary construction enterprises accounts for the difference between the two tables. The extrapolation of data for the post-1980 period is

based on continuing the trend in the ratio between unfinished production and total inventories of the construction sector.

³³ For example, refer to M. Nazarov, ed., *Kurs Sotsial'no-Ekonomicheskoi Statistiki*, (Moscow: Finansy i Statistika, 1982), pp. 209 - 210. and E. Freidmunt, and M. Eydel'man, *Ekonomicheskaya Statistika*, (Moscow: Statistika, 1976), p. 125.

³⁴ See Gosplan (1974), p. 616.

³⁵ U.S. Congress, Joint Economic Committee, *U.S.S.R.: Measures of Economic Growth and Development, 1950-80*, 97th Congress, 2nd Session, 1982, p. 87.

³⁶ According to I. Dmitriyev, ed., *Ekonomika Stroitel'stva na Novom Etape*, (Moscow: Mysl', 1982), p. 98, prices in construction increased by 20 percent between 1966 and 1976. Construction between 1976 and 1980 turned out to be 60 billion rubles more expensive than originally planned.

³⁷ E. Freidmunt, and M. Eydel'man, *Ekonomicheskaya Statistika*, (Moscow: Statistika, 1976), p. 96 and 423.

³⁸ As listed in the NKh table on sources of financing working capital, "creditors" (primarily the state budget) financed 58-60 percent of working capital in construction compared to 9 percent in industry and 7 percent in agriculture.

³⁹ This was learned through personal communication.

⁴⁰ The ratio between capital in productive and household services is around 70:30. Capital of budget-supported services comprises 10 percent of the total. Refer to Section 10 for the derivation of the above ratios.

⁴¹ Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*, (Novosibirsk: Nauka, 1981), p. 96.

⁴² A. Kocherga, *Sfera Obsluzhivaniya Naseleniya*, (Moscow: Mysl', 1979), p. 81.

⁴³ See NKh 1974, p. 58.

⁴⁴ L. Kolesov, *Mezhootraslevye Problemy Razvitiya Transportnoi Sistemy*, (Novosibirsk: Nauka, 1982), p. 58.

⁴⁵ Ibid, pp. 14 -15.

⁴⁶ Gosplan (1974), p. 609.

⁴⁷ G. Sorokin et al. *Factory i Tendentsii Razvitiya Struktury Narodnogo Khozyaistva SSSR*, (Moscow: Nauka, 1977). Consumption of other goods was 2.5 billion, of which printed books and journals accounted for 2.2 billion.

⁴⁸ Zalkind, pp. 22 - 23.

4.0 THE END USE OF GOODS

This section focuses on the domestic demand for producer and consumer goods, including the intermediate product, capital depreciation, current consumption and net investment. Exports will be discussed in a separate Section devoted to foreign trade.

4.1. THE STRUCTURE OF THE INTERMEDIATE PRODUCT

The intermediate product equals the difference between the GSP and the sum of the PNI and depreciation of civilian production capital. It constitutes more than 50 percent of the GSP. Thus, it is essential to derive at least approximate data on the structure of the intermediate product of major production sectors before estimating the structure of final demand.

The official statistical coverage of the interindustry flow is based on the input-output method which diverges from the NEB method in the following respects:¹

1. The value of agricultural materials in input-output tables exceeds their value in the NEB by the amount of net subsidies on meat, dairy and other agricultural products purchased by food and light industry.
2. Total purchases in input-output tables also exceed those in the NEB by T&C and T&D expenses, which are double counted in input output tables in all sectors.
3. While the input-output table covers the flow of particular goods, the NEB tables cover the output of particular enterprises. Among several exceptions are capital repair works performed outside the MBMW sector.

The NKh regularly includes information on the GSP, PNI, capital depreciation and the structure of industrial production outlays that made it possible to estimate the total intermediate product of major sectors in Section 3.0. These estimates can be compared with input-output data for 1972 derived from Granberg (1978), Volkov (1976), Matlin (1976), the NKh editions for 1967 and 1973 and other Soviet sources. In their definitive works on the input-output structure of the Soviet economy, researchers working in the Bureau of the Census, U.S. Department of Commerce, reconstructed the interindustry flow for these years using the above Soviet sources.²

In order to compare their results with those derived in this study it is necessary to reduce their totals by the amount of T&C and T&D charges and net subsidies. The latter equaled 15.1 billion in 1972, including 1.6 billion in light industry and 13.5 billion in food industry.³ In addition, their estimates for the glass sector must be subtracted from their totals for the construction materials sector and added to their total for the n.e.c. sector. In this way, the difference between their estimates and those derived in this study is reduced to the value of the subsidiary industrial production.

The comparison of the input-output and NEB data on the total intermediate product of major production sectors for 1972 is presented in Table 4-1 below:

Table 4-1 COMPARISON OF INPUT-OUTPUT AND NEB METHODS
(in billions of current rubles)

	<u>I/O Method</u>	<u>NEB Method</u>	<u>Discrepancy</u>
Total Economy	366.6	366.6	0.0
Total Industry	275.0	274.6	+0.4
Metallurgy	26.5	27.0	-0.5
Fuels	11.9	12.6	-0.7
Power	6.1	5.9	+0.2
MBMW	59.6	58.9	+0.7
Chemicals	16.6	17.3	-0.7
Wood and Paper	11.7	10.6	+1.1
Constr. Mater.	9.1	9.5	-0.4
N.E.C.	7.1	8.2	-1.1
Light	53.8	53.3	+0.5
Food	72.6	71.3	+1.3
Agriculture	42.4	42.3	+0.1
Construction	39.1	39.0	+0.1
T&C	6.1	6.3	-0.2
T&D and other	4.0	4.1	-0.1

According to Gol'denberg (1980), methodological differences account for the discrepancy in the GVOs of aggregated industrial sectors that can reach 6 percent.⁴ It can be assumed that the discrepancy for the intermediate product reaches only 4 percent. The above discrepancies are within a normal range for all sectors, except for wood and paper, food and n.e.c. sectors. Further investigation must determine whether excessive discrepancies result from the estimation error committed by this author or from the imprecision of the NKh data on the structure of industrial production outlays. The authors of the reconstructed input-output table derived data on the n.e.c. using the residual methods which also may not be reliable.

For the purposes of this study, the detected discrepancies are still relatively small to invalidate the integration of the input-output and NEB data on the intermediate product. While the input-output data throws light on changes in the structure of this product between 1959 and 1972, the regularly published NKh tables contain enough information to estimate this product for major production sectors and price indexes. The procedure is first to analyze structural changes and the effect of prices. The smaller the structural change, the more justified is the extrapolation of available data for the rest of the 1970s. The analysis deals with the transformed input-output data that is appropriate for compiling the NEB for 1966 and 1972.

The structure of material outlays based on the original input-output data is presented in Table 4A2 in Volume II for heavy industries and in Table 4A3 for all other sectors. Table 4A4 presents the structure of material outlays for all fourteen production sectors based on the transformed input-output data. The following discussion focuses on each sector to establish patterns in each sector's production linkages with all other sectors for the period ending in 1981.

Metallurgy. The ratio between the intraindustry use and this sector's total material outlays remained around 65.5 percent until January of 1982, the date of new price reforms. Similarly, little change can be observed in the relative use of power, MBMW, wood and paper and scrap collection. The ratio for chemicals decreased from 3.1 to 2.3 percent (a decrease of 0.13 each year), while that for light industrial products decreased from 1.5 to 0.8 percent (0.12 percent decrease a year). The value of fuels consumed by the metallurgical sector is determined as a residual.

Fuels. The intraindustry use increased from 66.3 to 77.1 percent. The ratio for metal use dropped from 2.1 to 1.2 percent (0.15 percent decrease each year), that for MBMW from 5.1 to 4.6 percent (less than 0.1 decrease each year) and that for chemicals from 4.9 to 3.4 percent (0.25 percent decrease each year). Although the actual annual percentage decrease of the use of power and wood products is a subject of somewhat greater uncertainty, in value terms the fuel sectors' use of these products changed insignificantly (0.9 - 1.0 billion for power and 0.6 - 0.4 billion for wood products). In order to reduce the margin of error, the value of intraindustry use can be estimated as a residual.

Power. The intraindustry use decreased from 94.3 to 87.6 percent, while the use of MBMW materials increased from 2.7 to 5.7 percent. Given the relatively small value of material outlays of the power sector and its predominant reliance on the fuel consumption, the extrapolation of data can be simply based on the comparison of structural features in value terms. The use of power and MBMW products could not change by more than 0.2 and 0.3 billion rubles respectively. The value of fuel consumption can be thus determined as a residual.

MBMW. Metals and MBMW products together accounted for 78.3 percent of this sector's total material outlays in 1966 and 79.9 percent in 1972 (0.27 percent increase a year). It therefore makes sense to determine first the value of other materials used by this sector and then the cumulative value of metals and MBMW products as a residual. The relative use of other materials was stable, except for

chemicals (0.15 percent decrease a year). Major problems are encountered in estimating the relative shares of metal and MBMW products in the derived residual. Any approximation must be thoroughly substantiated due to the large absolute value of material outlays of the MBMW sector.

The analysis of changes in the structure of production usually pursues the objective of defining the correlation between the pace of technological progress and price trends. One approach for measuring the pace of technological progress in the MBMW sector can be based on comparing the relative increase of this sector's intraindustry flow with relative decrease of this sector's metal use. The noted increase indicates greater specialization and cooperation of production, while the noted decrease indicates greater efficiency in the use of metal products.

The period between 1959 and 1966 is known for its relative price stability. According to Volkov (1976), during this period the MBMW intraindustry use increased by almost 16 percentage points, while the reliance on metal products decreased by almost 11 percentage points.⁵ In conditions of price stability, one would expect that the same two opposing trends would have continued after 1966. However, as data on prices derived in Section 3 indicates, price reforms of the late 1960's resulted in the decrease of the MBMW price index by 15 percent and in the increase of the ferrous metallurgical price index by the same 15 percent. These price changes had a corresponding influence on the structure of material outlays of the MBMW sector: the metal use decreased by only 5 percent and the MBMW intraindustry flow increased by only 7.1 percent. One can conclude therefore, that price changes suppressed the expected impact of technological progress on the structure of production by as much as 30 percent.

This conclusion, however, hinges on the condition that the growth rate of technological progress and its corresponding impact on the structure of production in conditions of price stability is constant. When one treats this condition as a constraint in a model that measures the decrease in the ratio between metal use and the MBMW interindustry flow in the MBMW sector, then it is possible to isolate the impact of prices on this ratio. The latter equaled 56.7:43.3 in 1959, 39.3:60.7 in 1966 and 32.3:67.7 in 1972. The objective is to estimate this ratio for the late 1970s using the effect of price changes on this ratio as an independent variable.

During 1972-1978, prices increased by 9.0 percent in the ferrous metallurgy and decreased by 30 percent in the MBMW sector. The impact of price changes was 30 percent larger in 1972-1978 than in 1966-1972. Prices thus suppressed the impact of technological progress on the structure of production by as much as 40 percent during 1972-1978. In conditions of price stability, the noted ratio would equal 17.3:82.7 in 1978. In reality, price changes artificially increased it to the level of 25.0:75.0. The same correlation analysis is applied here to the estimation of this ratio for all other years of the observed period.

A completely different estimation method is based on data supplied by Heinman and Palterovich (1982).⁶ According to their estimates, the direct input coefficient measuring the use of machine-building (MB) products relative to the MBMW GVO equaled 0.166 in 1959, 0.213 in 1966, 0.238 in 1970, 0.250 in 1972 and 0.266 in 1975. The annual average increase was 0.67 percent in 1959-1966, 0.62 in

1966-1972 and 0.55 in 1972-1975. As derived in Section 3, material outlays comprised 55.6 percent in 1972 and 58.0 percent in 1975. If one measures the use of MB products relative to material outlays of the MBMW sector, then the coefficient must be recorded as follows: 0.382 in 1966, 0.418 in 1970, 0.436 in 1972 and 0.459 in 1975. There was an annual decrease of 0.9 percent during 1966-1970 and 1970-1972, but 7.7 percent during 1972-1975.

Data derived in this section indicates that the ratio between total intraindustry flow (including MW and repair) and the material outlays of the MBMW sector equaled 0.476 in 1966 and 0.547 in 1972. 0.476 is larger than 0.382 by 1.246, while 0.547 is larger than 0.436 by 1.2545. This illustrates that outlays on metal works and repair outpaced material outlays on MB products, but not by a significant amount (around 0.14 percent a year). It thus becomes possible to compute the intraindustry flow within the MBMW sector for 1970 and 1975. In percentage terms, it equaled 52.3 (0.418×1.2517) and 57.8 (0.459×1.2587), respectively. Using the first proposed method results in 52.5 and 58.5 percent respectively for those two years. In order to reduce the margin of error, the average between the two sets of results is accepted here and results derived using the first method for other years are reduced by 0.1-0.3 percent. Data for 1973 are derived from the NKh table on direct input coefficients for this year.

Chemicals. This sector is engaged in production of chemicals, petrochemicals and rubber products, except for rubber footwear that are produced in light industry and pharmaceuticals that are treated as part of other industrial production (n.e.c.). Results presented in Table 4-5 below indicate that the structure of chemical production changed little during 1966-1972, except for the increasing reliance on MBMW products and the decreasing reliance on light and food industrial products. The cumulative share of those sectors whose participation in chemical production changed little actually decreased from 82.5 to 79.1 percent, largely as a result of the dramatic growth in the cooperation between MBMW and chemical sectors. The intraindustry use decreased only by 0.4 percent from 50.5 to 50.1 percent.

The participation of MBMW sectors increased from 2.1 to 9.2 percent and that of light and food industrial decreased from 7.3 to 5.8, and from 8.1 to 6.0 percent respectively. It is easier to project changes in the participation of these sectors in chemical production in the post-1972 period in value rather than in percentage terms. The value of light industrial products increased only by 0.2 billion, while that of food industry by 0.1 billion. The same trend can be expected for the rest of the decade. Consequently, the value of MBMW products can be determined as a residual.

Wood and Paper. The intraindustry use comprised 65.0 percent in 1966 and 63.2 percent in 1972. This indicates an average annual drop of 0.3 percent. Participation of all other sectors remained quite stable, meaning that the technological progress had little effect on the structure of production in this sector. It is sufficient to emphasize a relatively greater use of fuels, MBMW, and chemical products and a smaller use of metallurgical and light industrial products.

Construction Materials. The intraindustry use decreased from 42.5 to 39.8 percent, an average annual drop of 0.45 percent. The participation of all sectors

remained stable with the exception of the MBMW sector, whose share increased from 6.2 to 8.4 percent (an average annual increase of 0.37 percent). The ratio for metallurgical, wood and paper products and power fell by 0.7, 0.7 and 1.0 percent respectively during the six-year period, while that of chemicals remained the same.

The estimation procedure must be first focused on determining the value of those production inputs whose share in total material outlays of the construction materials' sector remained stable. The cumulative value of the intraindustry flow and MBMW products then can be determined as a residual. The ratio between these two production inputs was 87.3:12.7 in 1966 and 82.6:17.4. The price index of the construction materials sector was quite stable during the observed period. It increased by 8 percent between 1965 and 1972 and then decreased by 5 percent in 1975. Rather than analyzing the impact of price trends, however, one can simply continue the trend in the MBMW sector's participation, which displayed an annual increase of 0.1 billion during 1966-1972. The intraindustry use then can be determined as a residual. The margin of error is quite insignificant because this sector's total material outlays increased by only 0.4 billion between 1976 and 1980.

Other Heavy Industries (n.e.c.) The available data on these industries is less precise than that on all other sectors because of the estimation procedure based on a residual method. This explains inordinate fluctuations in the structure of these sectors' material outlays during 1966-1972. These sectors' total material outlays increased by 0.4-0.6 billion annually before 1978 and by 0.2-0.4 billion after that year. The objective, therefore, is to determine what production inputs participated in these annual increments. By far, agricultural production inputs were dominant during 1966-1972 and they were expected to be dominant throughout the 1970's. The annual growth of 0.2-0.3 billion that occurred before 1972 is projected after that year as well. The remaining annual increases of 0.2-0.3 billion are divided proportionally to each sectors' participation in the production of other heavy industries during 1966-1972.

Light Industry. The structure of production remained almost unchanged in this sector. What makes the estimation procedure easier in this sector than in others is that the intraindustry use and agricultural inputs equaled as much as 91.4 and 90.7 percent of total material outlays in 1966 and 1972. The share of intraindustry use alone equaled 77.6 percent in 1966 and 77.1 percent in 1972. The only notable change that took place was the increase of chemical inputs from 4.3 to 5.4 percent. The value of chemical materials is determined here as a residual.

Food Industry. The cumulative share of the intraindustry use and agricultural input decreased from 95.7 to 93.0 percent. This decrease was partially caused by a poor harvest of 1972 and by a greater participation of fuels, MBMW, chemicals and wood and paper sectors in food industrial production. Although the increase was insignificant for each of the above sectors, the total increase for these sectors amounted to 1.5 percent over the six-year period. The same increase can be expected in the post-1972 period. The share of intraindustry use decreased by only 0.2 percent from 42.6 to 42.4 percent.

The decrease would have been apparently larger, providing more agricultural materials were available for industrial processing. In order to reduce the margin of error, the change in the value of agricultural materials used in food

industry must be correlated with the change of both material outlays of food industry and the state procurement of crops, meat and dairy products (including imports), which are estimated in Section 3. The margin of error depends on the extent to which total material outlays of the food industry fluctuate with respect to the availability of agricultural materials. Since the available data points to a high correlation between the level of agricultural procurement and material outlays, it appears that the estimation error is below 0.5 percent (0.3 - 0.5 billion). Further estimation tests performed below confirm this assumption.

Agriculture. The analysis of production inputs in this sector is most complex due to significant shifts that took place during 1966-1972. Practically, the relative position of every production input changed dramatically during this six-year period as a result of numerous interdependent factors that shape Soviet agricultural policy. In an attempt to simplify the analysis, thus making it possible without additional computer-assisted research, this author decided to base estimates on the assumption that the ratio between agricultural materials and total supply (GVO plus imports) remains stable in the agricultural sector for many years. A TSU official published an informative article in Vestnik Statistiki on the place of agriculture in the NEB.⁷ Data cited in this article indicates that the noted ratio equaled 23.1 percent in 1959, 20.1 percent in 1966, 20.3 percent in 1972 and 19.8 percent in 1976. Data for 1966 and 1972 were included in the NKh for 1967 and 1973 but data for 1976 was never previously published.

The temporary increase of the noted ratio in 1972 was a result of limited financial resources available to agricultural enterprises for purchases of industrial goods. In a normal year it would have been around 19.9-20.0 percent rather than 20.3 percent. According to the above article, the general declining trend is a result of the production shift from unprocessed to processed animal feed during the 1959-1976 period. However, the impact of the increasing production of processed feed on the structure of material outlays had little effect on the ratio between agricultural materials and total material outlays after 1966, largely because of significant agricultural price increases. The effect can be seen rather in declining ratios for fuels (from 10.5 to 6.1 percent), MBMW products (from 12.7 to 9.2 percent) and chemicals (from 9.3 to 5.9 percent). These trends were also influenced by declining heavy industrial price indexes and a policy of subsidies on machines and fertilizers sold to agriculture.

Total industrial inputs to agricultural production equal the difference between material outlays and outlays on agricultural materials. This total consists of those industrial materials whose share in material outlays of the agricultural sector changed relatively little (power, wood and paper, construction materials, light industry and other sectors) and other materials (fuels, MBMW, chemicals, other heavy industry and food industry).

At this point, there are two ways to proceed: 1) to divide the annual increases of industrial materials proportionally to the change in the participation of each industry in the agricultural production during 1966-1972; and 2) to continue the trend in the change of structure of production established during 1966-1972, taking into consideration industrial price changes. The second way is quite cumbersome and cannot be performed without computer support. The first way, though less precise, leads to results with an insignificant margin of error due

to relatively small annual increases in the value of industrial materials. For example, the two largest increases were 2.5 billion in 1975 and 2.8 billion in 1979. When divided among five industrial sectors, these amounts decrease to 0.3-0.7 billion for each sector, with the largest parts (0.6-0.7 billion to other heavy industries and the food industry). The estimation error thus cannot exceed 0.2 billion for each sector, even for those two years. In an attempt to reduce the margin of error, the changes in production inputs are correlated with changes in the output of participating industries.

Construction. Construction materials comprise almost half of all materials used in construction. Their portion in total material outlays of this sector declined from 47.2 to 45.3 percent during 1965-1972, which constitutes an average annual decline of 0.3 percent. The same trend can be expected for the rest of the observed period as the Soviet construction sector shifts from wooden-based to metal-based structures with greater automation. As expected, the ratio for wood and paper products declined from 13.9 to 12.0 percent (an average annual decrease of 0.3 percent), while that for metal and MBMW products increased from 9.3 to 10.7 and from 16.2 to 19.9 percent respectively. In order to reduce the margin of error, the annual values of these products can be estimated as residuals after accounting for all other production inputs to the output of the construction sector.

The ratio for fuels increased from 3.2 to 4.4 percent, an average increase of 0.2 percent or 0.16 billion a year. The ratio for chemical products increased from 3.2 to only 3.6 percent, while the ratio for light industrial, other heavy industrial and other sectors' products changed insignificantly during the observed period. Estimated as a residual, the cumulative value of metallurgical and MBMW products increased from 12.7 billion in 1973 to 15.4 billion in 1978 and to 16.6 billion in 1981. The ratio between these products was 36.5:63.5 in 1966 and 35.0:65.0 in 1972. On the basis of arguments presented during the discussion of material outlays in the MBMW sector, it is expected that this ratio was 33.5:66.5 in 1978. The change in this ratio established during 1966-1972 is expected, therefore, to remain the same after 1972.

Transportation and Communication. Although total material outlays of this sector more than doubled from 5.4 to 11.6 billion during the 1970's, most production inputs increased on the average by only 0.1 billion a year. The value of fuels, the predominant production input, hence can be determined as a residual. In percentage terms, the ratio for fuels increased from 44.6 in 1966 to 47.3 in 1972 and to 56.5 in 1981. Most of the increase took place as a result of price increases on gasoline and other fuels in 1978.

Trade, Distribution and Other Production Sectors. These sectors' material outlays grew at a very slow rate during the 1970's, reaching only 4.7 billion in 1981 from the level of 4.0 billion in 1972. Similar to agriculture, construction, and other production sectors, these sectors experienced a decreasing need for wood and paper and light industrial products and the increasing need for MBMW products. The unexpected relative increase in the use of agricultural and food industrial products can be explained in terms of losses of these products by trade and dining institutions.

Concluding Notes. The above analysis of changes in the structure of intraindustry and interindustry flow covered the period ending in 1982. New prices on power, fuels, construction, metal and MBMW products introduced in January of 1982 brought radical changes in the structure of production. Due to the fact that the input-output data for 1982-1983 apparently will be never released for public scrutiny, the NEB reconstructed for the pre-1982 period combined with the NKh data for 1981 - present provide the only framework for analyzing the Soviet economy during the 1980's.

The NKh tables on the structure of industrial and agricultural production outlays list an entry on the use of power and fuels by each industrial sector, large state farms and collectives. Some use of power and fuels is also hidden in the entry for the undifferentiated outlays. Following the 1982 price reforms, the value of these outlays increased sharply, especially the value of materials included in these outlays. This new development in Soviet pricing makes it possible to estimate the use of power and fuels by each industrial sector with an insignificant margin of error. In agriculture, only a very insignificant part of outlays on power and fuels is registered as part of other outlays.

In order to derive data on the entire agricultural sector, the derived data on large state and collective farms can be divided by the percentage share of these farms' purchases of industrial materials in the total purchases of the agricultural sector (more than 95 percent). Data on the use of power and fuels by all other production sectors can be derived using the trend in the distribution of these materials between production sectors established before 1982. The same approach can be used for all other materials, except for metals and MBMW products. The use of these products by production sectors is determined here either as a residual or by employing the correlation analysis that traces the effect of prices on the structure of production outlined above.

The derived structure of the intermediate product leads to total material inputs produced by industrial, agricultural and other sectors. For example, in order to estimate the value of material inputs produced in the MBMW sector, it is necessary to add all MBMW products used as inputs in the production of industrial, agricultural and other goods. The results of this adding procedure are presented in Table 4A1 in Volume II in both value and percentage terms.

4.2 DEPRECIATION OF FIXED CAPITAL

There are two systems for planning used up capital in the Soviet economy. One system is operational in the profit-seeking sector, while the other operates in the state budgetary sector. All profit-seeking enterprises are required to form capital replacement and repair funds in the amount that exceeds the value of used up capital. In contrast, planners allocate funds for financing depreciation in budget-supported social services that are usually insufficient for a proper maintenance of their capital stock. Since all defense production enterprises are budget-supported, they are not required to finance their own depreciation funds. This allows TSU officials to conceal those funds together with those of the administration sector. The total depreciation in the Soviet economy thus must be

estimated as the sum of depreciation in profit-seeking, civilian and defense budgetary sectors.

Science, housing and road administration sectors are also exempt from forming their own depreciation funds.⁸ The housing administration has insufficient funds to finance capital investment and repair and thus relies on budgetary support. Enterprises in charge of maintaining housing, education, health and other facilities of service sectors form only capital repair funds.⁹ Depreciation funds for certain equipment, gardening, working livestock, and land reclamation are formed primarily for replacement purposes.¹⁰ Uninstalled fixed capital and productive livestock are not depreciated.

4.2.1 Profit-seeking enterprises

Basic concepts. Annual deposits on depreciation accounts of enterprises are determined fifteen years in advance when planners set depreciation rates which planners derive using the following equation : $d = D/T = (F - L + R)/T$, where d is the annual depreciation fund, D is the total fund, F is the original undepreciated value of capital stock, L is the liquidation value of capital stock, R is the total repair cost that increases the value of capital stock, and T is the time during which capital stock is operational. Planners usually set new rates in the aftermath of their reevaluation of the fixed capital stock. The last reevaluation was completed in 1971 for profit-seeking enterprises and in 1972 for budget-supported enterprises. New rates were introduced in January of 1975.

Although the overall average size of new rates actually decreased from 6.4 to 6.3 percent, depreciation funds increased significantly due to the fact that planners appreciated fixed capital stock.¹¹ Before 1975 depreciation funds were estimated as a particular percentage of the average annual unappreciated value of fixed capital.¹² Another change in the estimation of depreciation funds was a significant shift in the ratio between the replacement and repair funds. This ratio was around 50:50 before 1975 and 59:41 after 1975. While replacement rates increased on the average by 12.5 percent, repair rates decreased on the average by 15.7 percent. This shift in the ratio between the replacement and capital repair funds illustrates a decrease in the period during which the capital stock is operational, which in turn depends on the pace of technological progress. The average operational period of industrial machines and equipment, for example, decreased from 14.5 to 12.2 years with the introduction of new rates.¹³

The way planners determine annual depreciation of capital is one of the least explored areas of Soviet national accounts. Given the above equation, annual depreciation equals $d=f+r-l$, where $f=(F/T)$ is the annual renovation fund, $r=(R/T)$ is the annual capital repair fund, and $l=(L/T)$ is the annual liquidation value of capital, which is net worth of scrap collected after the disassembly. The above equation, however, does not take into account the fact that while some capital is replaced before the expiration of its operational period, other capital is kept operational long after its planned liquidation. It also does not take into account that while all depreciation funds must be entered on the accounts concurrently (during the same year) with the installation of new equipment, the actual maintenance and replacement of capital begins in later years.¹⁴

Planners cannot predict precisely "premature" or overdue replacements because they cannot establish in advance the exact time when capital becomes technologically obsolete or when it will be destroyed due to oversight or natural calamities. Planners call the difference between the undepreciated value of liquidated capital and l as "the unamortized value," which is registered separately from depreciation funds. The unamortized value, which will be referred here as the unamortized writeoffs, is subtracted from gross revenues received by enterprises and added to their material and depreciation outlays.

Most Soviet authors writing on capital depreciation are so simplistic that they usually fail to proceed beyond the above equation. It is not surprising therefore that they remain oblivious of the way planners actually estimate the total annual depreciation. The planners' approach, however, is not difficult to understand if one follows the planners' transformation of financial outlays on capital depreciation into the NEB format.¹⁵ Planners begin their estimations with the same basic equation $d=f+r-l$. Then, they must add to this equation the following variables: depreciation funds that are formed in excess of current depreciation needs (a), and extra losses incurred in connection with the premature liquidation of capital (b), the above equation thus takes the following form: $d=f+r+x$, where $x=b-(a-l)$. TSU officials only publish data on $f+r$, thus completely ignoring x . In this way, TSU officials conceal d , the actual allocation of f and r , as well as $a-l$. The discussion below will refer to x rather than to $a-l$ as unamortized writeoffs.

Soviet authors often quote Marx to emphasize the dual nature of the replacement fund as a source of both replacing liquidated capital and financing net fixed investment. In 1973, liquidation rates comprised around 51 percent of replacement rates for the entire economy and 45 percent for industrial sectors.¹⁶ Garbuzov (1984) noted that the ratio between replacement and liquidation rates grew from 1.5 in 1970 to 1.6 in 1980.¹⁷ Notkin (1981) emphasized, however, that one cannot compare these rates without first analyzing changes in installation costs and productivity of capital.¹⁸

The sum of replacement and unamortized values equals total resources that are allocated to install new capital in place of the liquidated capital. The period between the installation of new and liquidated capital is around 20 years during which installation costs change significantly. The current liquidation value thus can be used only for analyzing the physical volume of the capital stock and not its worth to society, which is measured in terms of the remaining undepreciated value. As a result, planners use the liquidation value for estimating the original installation value of capital stock and use the replacement value for estimating the installation value of capital stock net of depreciation. The difference between the value of this capital stock in the end and beginning of each year is the same as that between total additions of capital and the sum of replacement and unamortized writeoffs.

While Soviet authors emphasize the discrepancy between replacement and liquidation rates, they confuse themselves and their readers regarding the actual estimation of capital depreciation by planners during their compilation of the NEB. Despite the fact that some replacement funds may indeed serve as a source of hypothetical net investment, planners exclude the entire capital investment

financed with depreciation funds from national income and hence from net investment. At the same time, it is unused capital repair funds that indirectly cover capital losses incurred in connection with a "premature" liquidation of capital. Most Soviet authors appear ignorant of this fact, thus providing a misleading interpretation of the differences between the financial and NEB data on capital depreciation.

Khorunzhiy (1971) and Senchagov (1975) are notable exceptions to the rule. They explain the chronic gap between capital repair funds and the actual value of capital repair works in terms of time differences between the installation of new capital and the disposal of obsolete capital. They also see it as a measure ensuring the distribution of funds between enterprises and the availability of these funds for financing technological innovations. It appears that while excessive funds are extracted to the state budget, these funds increase net revenues earned by enterprises and thus counterbalance capital losses.

Data on the allocation of depreciation funds is available for 1972; it is reproduced unchanged-as published by Senchagov (1975)--in Table 4-2 below. The entry "change of purpose" stands for transfers between replacement and repair funds inside the same enterprise, while the entry "central distribution" stands for the distribution of the same funds between enterprises. As evident from the above chart, enterprises spent 97 percent $[(71.5+16.9):90.9]$ of their replacement fund and 89 per cent $(73.1:82.2)$ of their repair funds in 1972. According to Senchagov (1975), industrial enterprises spent 88-91 percent of their repair funds on repair works during the period ending in 1972. In 1973, they spent 86 percent of their repair funds.¹⁹

What all this information amounts to is that the reallocation of funds remained the same till 1979, the year when the ratio between repair works and repair funds declined by 5 percent due to the increase in the reallocation of resources between funds.²⁰ The end result of this reallocation process was the inefficient saving of repair funds in favor of larger budgetary revenues. Savings from capital maintenance are only temporary because they lead to a faster tear and wear of capital and to its decreasing productivity. Given the fact that some unallocated repair funds are used for purchasing new equipment, it can be safely assumed that replacement funds approximately equal the value of replaced capital. If one believes standard Soviet economic textbooks, such as Malyi and Sis'kov (1978) and Nazarov (1981), then planners appear to make the same assumption in their own estimation of the replacement component of capital depreciation.²¹

Table 4-2 REALLOCATION OF DEPRECIATION FUNDS IN 1972

	<u>Replacement Funds</u>	<u>Repair Funds</u>
Total Financing	100.0	100.0
Funds from last year	0.8	10.6
Current Deductions	90.9	82.2
Change of purpose	4.6	0.1
Central distribution	3.3	4.5
Other sources	0.4	2.6
<hr/>		
Total expenditures	100.0	100.0
Change of purpose	0.1	4.1
Central distribution	3.8	4.6
Budgetary payments	4.8	0.2
Credit payments	0.5	---
Centr. investment	71.5	---
Decentr. investment	16.9	---
Completed repairs	---	73.1
Purchase of Equipment	---	1.9
Other expenditures	1.1	4.1
Unused funds	1.3	12.0

Senchagov's data covers the period before the introduction of new replacement rates. Even though only a limited amount of information is available on the way new rates affected the allocation of depreciation funds starting in 1975, the researcher can make a qualified guess. According to Garbuzov (1984), credit and budgetary payments comprised 3.5 and 7.3 percent of the replacement fund respectively in 1980, while funds allocated for other purposes comprised 1.1 percent. Enterprises thus spent 88 percent of their replacement fund on capital investment. According to the same Soviet source, enterprises continued to spend around 90 percent of their repair funds on capital repair works until 1979 when 15 percent of these funds was reallocated.²²

While TSU officials regularly publish the total size of replacement and repair funds for state-cooperative sectors, they refuse to reveal information on the way these funds are actually allocated. In addition, they refuse to publish information on depreciation funds of collective and private farms and subsidiary enterprises as well as on the unamortized writeoffs. This concealment practice

complicates the estimation of capital depreciation in profit-seeking enterprises thus requiring the extensive use of secondary Soviet sources. The objective is to combine information listed in these sources with the NKh data on depreciation funds and the structure of production.

The estimation procedure. The information on total depreciation is published by Soviet authors only in connection with the reconstructed input-output tables. The latest data was published for 1972 in Volkov (1976) and Granberg (1978). Volkov divided the end material product into depreciation (11.1%), wages (44.9%) and net revenues (44%); as well as the GSP into material and depreciation outlays (56.3%), wages (22% or 158.1 billion rubles), and net revenues (21.7%). He also quoted the ratio (29.8%) between net revenues and the average value of productive capital stock. The latter is reported in the NKh for 1974 as 498.5 billion rubles. The difference between two of his estimates of wages equals bonus wages paid from the net profit, which are estimated in the next Section at 6.7 billion rubles. The NKh data on capital stock and the derived bonus wages lead to two estimates of the end material product--337.1 and 337.5 billion rubles--the average of which (337.3) is accepted in the present study. Volkov's ratios leads to total depreciation of 37.2 billion rubles for 1972.

Granberg quoted the ratio between total depreciation and supply of goods for industry, agriculture and construction. Tretyakova and Kostinsky (1983), the two authors of the reconstructed input-output table, determined on the basis of Granberg's data that total depreciation in these sectors equaled 20.2, 6.9 and 3.4 billion rubles respectively.²³ Determined as a residual, total depreciation in T&C, T&D and other production sectors equaled 6.5 billion rubles. The input-output data on depreciation deductions and unamortized writeoffs is always aggregated. In contrast, all NKh data on depreciation excludes unamortized writeoffs. Using the NKh table on the structure of industrial production outlays, it was estimated in the previous Section that depreciation in industry equaled 19.5 billion rubles in 1972. It follows, therefore, that industrial unamortized writeoffs equaled 0.7 billion rubles (20.2-19.5).

According to Masal'skiy (1974), the ratio between unamortized writeoffs and liquidated capital equaled 0.20, 0.10, 0.17, and 0.19 for industry, agriculture, T&C, and T&D sectors in 1972 respectively.²⁴ During that year these sectors' average annual value of productive capital stock equaled 266, 101, 64 and 31 billion rubles, while liquidation rates equaled 1.3, 3.5, 1.1, and 1.5 percent. Unamortized writeoffs then amounted to 0.7, 0.3, 0.1, and 0.1 billion rubles in the above sectors. There is no data on liquidation rates in the construction sector. Even though the indirect evidence indicates that these rates are by far highest in the Soviet economy, the size of the construction sector's capital stock is smallest among all production sectors. It is thus assumed here that its unamortized writeoffs could not exceed 0.2 billion. In 1972, total unamortized writeoffs equaled 1.4 billion rubles.

This estimate is smaller than that provided by Tretyakova and Kostinsky by 1.1 billion rubles largely because these authors 1) misquoted Senchagov on liquidation rates in industry, 2) accepted Volkov's comment that the unamortized writeoffs comprise 7 percent of depreciation in the industrial sector,²⁵ and 3) relied on Kochkarev (1977) whose data leads to unamortized writeoffs for

collectives in the amount of 0.65 billion rubles for 1972. The author of the present study originally made a similar error by applying Volkov's and Kochkarev's rates. As a rule, Volkov is a reliable Soviet source. However, in this case he failed to specify what unamortized writeoffs and what year he was referring to. Senchagov observed that during 1970-1971 the ratio between unamortized writeoffs and liquidated industrial capital increased from 24 to 27 percent and then decreased to 20 percent in 1972.²⁶ The rate of 27 percent was extraordinarily high because enterprises were eager to retire more assets during a 1971 reevaluation. In contrast, Volkov's comment presupposes a rate of almost 40 percent for 1972. It is clear that Volkov referred to total capital losses rather than to the type of unamortized writeoffs that are registered as part of capital depreciation. In the same vein, Kochkarev observed that this rate equals 36 percent in collective farms.²⁷ In his case, however, he failed to divide total capital losses into the unamortized writeoffs, which reduce collectives' gross income, and planned losses, which are financed by state insurance agencies. It is quite unlikely that the unamortized writeoffs of collective farms are much larger than those of state farms.

The difference between the input-output data on total depreciation and the derived unamortized writeoffs equals depreciation deductions. Since these deductions can be determined for the industrial sector on the annual basis using the NKh data, the input-output data proves valuable primarily with respect to the non-industrial sector. In 1972, these deductions equaled 6.6, 3.4, and 6.1 billion rubles in agriculture, construction and all other production sectors respectively. According to Soviet sources, depreciation deductions of collective farms equaled 3.0 billion rubles, including 2.8 in agriculture and 0.2 in industry and construction, in 1972.²⁸ These sources provided data on collectives for most other years of the observed period as well. Deductions of state and private farms hence amounted to 3.8 billion rubles (6.6-2.8), including 3.6 in state farms and 0.2 in private farms. Deductions of state-cooperative industrial and construction enterprises equaled 19.4 (19.5-0.1) and 3.3 (3.4-0.1) billion rubles respectively.

As listed in the NKh for 1973, total deductions amounted to 18.7, 3.7, 6.5, 2.9, 1.4, 0.8, 0.8 and 0.4 billion rubles in state industry, agriculture, T&C, construction, T&D, communal services, other state sectors and cooperatives respectively in 1972. Data on the T&C sector can be disaggregated into production (4.6) and service (1.9) sectors using a 70:30 ratio which is applied to these sectors' capital stock. Data on the communal economy can be disaggregated into industrial and service sectors using a 60:40 ratio which is applied to this sectors' capital stock. Other state sectors include other production sectors (0.1), other service sectors (0.1) and other construction sectors (0.6--determined as a residual). Except for cooperative industry (0.1), all depreciation deductions of cooperatives must be added to those of the T&D sector. The NKh data is then transformed in the following way for production sectors : industry--19.3 (18.7+0.5+0.1); agriculture--3.7; construction--3.5 (2.9+0.6); T&C--4.5 (6.5*0.7); T&D--1.7 (1.4+0.3); and other production--0.1 billion rubles.

Estimation errors. The comparison of the input-output and NKh financial data reveals a discrepancy of +0.1 for industry, -0.1 for construction and -0.1 for agriculture. This small discrepancy is assumed to arise from the approximation of results to one decimal point. The above procedure thus can be repeated for all

other years of the observed period to determine depreciation funds entered in NEB tables with an insignificant margin of error even without having access to the precise input-output data.

The proposed transformation of the NKh data does not account for: 1) annual fluctuations of unamortized writeoffs (x); 2) annual allocations of replacement and repair funds; and 3) housing depreciation financed by profit-seeking enterprises. While CIA analysts, Tretyakova and Kostinsky ignored the allocation of depreciation funds altogether, they reduced depreciation deductions of production sectors by the amount of housing depreciation, which filled the gap between the input-output and financial data. However, the NKh table on depreciation deductions can only include data on the housing sector in the entry for other service sectors. Another difference between the proposed approach and that followed by the above analysts is that they assumed that planners do not account for depreciation in private farms, even though instructions published by Gosplan officials indicate the opposite.²⁹

It is difficult to evaluate the estimation error connected with annual fluctuations of (x) and (a) for the post-1972 period due to the lack of available data. The derived results seem to indicate that the size of x and a is quite small outside industrial and agricultural sectors. These results also indicate that the ratio between x and liquidated industrial capital decreased by only 7 percent (27-20) during 1971-1972, even though this ratio apparently reached its highest and lowest points during that period.³⁰ It thus can be safely assumed that this ratio fluctuated between 20 and 25 percent during the post-1972 period. The ratio measuring liquidated capital with respect to the total industrial capital stock in the beginning of the year is regularly reported in the NKh. This ratio fluctuated between 1.4 and 1.8 percent. Since the value of liquidated industrial capital reached only 7.0 billion rubles in 1980, it can be assumed that the estimation error for the industrial x could not exceed 0.2 billion rubles (7.0×0.05). For other sectors it is below 0.1 billion rubles.

There is practically no information on the allocation of depreciation funds in addition to what was already quoted above. This makes it difficult to determine the exact extent to which annual policy changes affected the ratio between unused and total repair funds. According to Senchagov (1975), this ratio fluctuated between 86 and 94 percent in the 1962-1973 period and fluctuated between 89 and 91 percent during nine of these years and remained at 91 percent during seven of these years.³¹ It thus can be expected that the estimation error does not exceed 2 percent for most of the observed period. In an attempt to substantiate this assumption it must be stressed that the decline of this ratio from 91 to 86 percent in 1972-1973 was caused by the drop in the MBMW price index which sharply reduced the per unit cost of M&E repair works in current prices. The derived MBMW price index thus allows one to link fluctuations in this ratio to price changes.

4.2.2 Non-Profit and Science Sectors

The TSU officials exclude these sectors from the NKh table on depreciation deductions, thus complicating the estimation procedure. The fact that depreciation deductions are not formed in budgetary and science sectors is well

documented in Soviet literature. However, no Soviet author has ever provided an unambiguous account of the way profit-seeking enterprises finance depreciation in service sectors and how this financing is registered in the official statistics. Nor can one find any coverage of the subject in the Gosplan and other official manuals. The reason why planners are so secretive in this area is that they want to conceal housing depreciation without which it is impossible to estimate the total for civilian consumption.

Housing. As noted by Senchagov and other Soviet sources, production outlays exclude housing repair funds altogether.³² The comparison of the NKh tables on industrial production outlays and depreciation deductions performed above vindicates Senchagov's note. What remains unclear is whether TSU officials conceal funds for housing and other service sector's repair in the entry for other sectors or exclude these funds entirely from the NKh table on depreciation deductions. There are three indications that the latter might be the case. First, all depreciation deductions are treated as production outlays by definition, while repair funds of non-profit service sectors are financed by production enterprises primarily by means of allocations from profit and other net revenues.³³ Second, the replacement fund of other sectors far exceeds their repair fund, while the opposite is the case for housing and service sectors. Third, depreciation deductions of other construction sectors are certainly hidden with those of other state sectors. It thus can be concluded that, except for the derived residual of 0.2 billion rubles, no housing depreciation funds can be found in the NKh. It is assumed here that this residual stands for depreciation of non-residential buildings operated by housing and everyday services.

Soviet authors writing on finances in the housing sector also note that while housing repair is financed from net profit, unused repair funds and multitude of other sources, none of these sources includes depreciation funds of profit-seeking enterprises that are part of the used capital repair fund.³⁴ According to Shermenev (1978), enterprises simply lack sufficient funds to finance housing repair on their own and must resort to the state budgetary support.³⁵ Capital repair appears to be financed in the same way as current expenditures of the housing sector, whose losses are known to be covered primarily from profit.

The only Soviet estimates of total housing depreciation that are available to the author of this study are those proposed by Sverdlik (1981).³⁶ He assumed that the depreciation rate has been 4 percent of the average annual value of residential houses since 1963, which is inordinately high compared to rates set for production buildings (2.7 percent). He used the appreciated value of the housing stock for the pre-1975 period when in fact planners began to use new rates in 1975. In addition, he failed to account for differences in housing depreciation depending on the sector of ownership and the type of housing structures. His overestimation of housing depreciation conveniently ascertained his design to cover the gap between the official private consumption fund and its civilian component. In sum, one must discard estimates and propose an alternative procedure that is based on combining data on public and private housing stocks reported by Rutgaizer (1975) with data on replacement and repair rates reported in Senchagov (1975) and in Barun (1971).

According to Rutgaizer, the ratio between privately owned and total housing declined gradually from 0.382 in 1965 to 0.286 in 1972.³⁷ The ratio dropped to 0.25 in 1973 and to 0.239 in 1974. While the gradual annual decrease was 0.015, a sharp drop in 1973 was caused by the considerable appreciation of public sector's housing compared to that in the private sector. The annual decrease of 0.015 is extrapolated for the post-1974 period. The public sector can be in turn divided into state, cooperative and collective sectors. The ratio between the latter and total housing stock increased from 0.006 in 1965 to 0.015 in 1974. The average annual increase of 0.001 can be assumed to continue throughout the observed period. The ratio between the cooperative and total housing increased from 0.008 to 0.029 during 1965-1972, which indicates the average annual increase of 0.003.

As reported in Senchagov (1975), the standard repair rate for state-owned houses decreased from 1.4 to 1.3, while the standard replacement rate increased by 25 percent in 1975.³⁸ According to Barun (1971), standard replacement and repair rates equaled 0.8 and 1.2 for non-wooden structures and 2.0 and 2.3 for wooden structures.³⁹ The comparison of Barun's and Senchagov's data suggests that the replacement rate for state-owned housing increased from 0.9 to 1.1.

In 1972, the average annual value of residential buildings in the state-collective sector equaled 130.0 billion rubles, while depreciation was 3.0 (1.2+1.8) billion rubles. As reported in the budgetary statistics, All-Republic budgetary outlays on repairs of buildings and installations in housing, T&C, education-culture, health and administration and science sectors equaled 3.0 billion rubles, including 0.7 and 0.3 billion rubles in education-culture and health sectors respectively. All-Republic budgetary outlays on construction repairs in T&C, administration and science sectors equaled 0.6 (0.3 + 0.2 + 0.1) billion rubles.⁴⁰ All budgetary outlays on housing services are implemented from All-Republic budgets. It follows, therefore, that budgetary outlays on housing repair comprised 1.4 billion rubles, while allocations of profit-seeking enterprises equaled 0.4 (1.8-1.4) billion rubles in 1972.

According to Ryabushkin (1977), the capital repair rate in the private sector equaled around 2.0 percent in the 1960s.⁴¹ It is assumed that this rate declined to 1.8 percent during the 1970s. In 1972, the value of privately owned housing equaled around 52 billion rubles, while the value of repair works performed by individuals equaled 0.9 (52×0.018) billion rubles. Replacement rates exceed liquidation rates in the state housing sector by 1.5 (0.9:0.6).⁴² It is assumed here that this multiplier is not applicable for the private construction sector where costs have changed little over the years and where the liquidation rate (1.3) is the same as the replacement rate. The replacement component of depreciation in private housing then equaled 0.7 (52×0.013) billion rubles. Depreciation of the cooperative housing was around 0.1 billion rubles in the early 1970s. Total depreciation of residential houses equaled 4.7 (3.0+0.9+0.7+0.1) billion rubles in 1972. The same procedure is repeated here for other years.

Services. Rutgaizer (1975) provided total depreciation for all service sectors for the period ending in 1973.⁴³ In 1972, total depreciation equaled 7.6 billion rubles, including 2.5 billion rubles in profit-seeking services determined above. Estimated as a residual, depreciation in science and non-profit organizations equaled 5.1 billion rubles. The analysis of finances in education-

culture and health sectors indicates that the All-Republic budgetary funds pay for 80 per cent of total capital repairs performed in these sectors, which thus equaled 1.3 (1.0:0.8) billion rubles in 1972. According to Rutgaizer, the ratio between replacement and liquidation rates in these service sectors equals 1.0. The value of liquidated capital in these sectors equaled 0.9 (0.6+0.1+0.2), while total depreciation amounted to 2.2 (1.3+0.9) billion rubles. The same results are obtained in Section 6 after analyzing the total volume of these sectors' services.

Budget-supported T&C services operate with capital stock that equals 10 percent of the total T&C capital stock. However, these services' stock consists primarily of building and installations (roads and bridges). It is thus estimated here that these services' depreciated capital equals only 7 percent of total depreciation in T&C sectors or 0.5 billion rubles in 1972.

Rutgaizer reported the repair rate (3.3) and the value of liquidated capital (0.24 billion rubles) for the science sector. The ratio between replacement and liquidation sectors in the science sectors is assumed to be the same as in industry--2.0.⁴⁴ Its total depreciation then equaled 0.9 (0.4+0.26*2) billion rubles. Depreciation in the administration sector then can be estimated as a residual--1.5 billion rubles, including repairs (0.7) and replacement (0.8)⁴⁵. The derived data is extrapolated for each service sector using the ratio between depreciation and material outlays established in 1975 after the introduction of new depreciation rates.

4.3 DEPRECIATION BY TYPES OF FIXED CAPITAL

Most fixed capital is produced in MBMW, woodworking, construction and agricultural sectors. Fixed capital produced in other sectors of the economy is insignificant in size. It consists of productive livestock, which is not depreciated, office supplies produced in the wood-working sector and other capital whose depreciation is insignificant. Construction sector manufactures buildings, installations and gear, as well as performs land reclamation works. The MBMW sector produces machines and equipment, means of transportation and tools. Gardening and working livestock are the types of fixed capital produced in the agricultural sector that are depreciated.

For the purposes of analyzing the end use of goods by sector it is necessary to divide repair and replacement of capital into four parts proportionally to the structure of fixed capital and depreciation rates set for each type of fixed capital. The NKh for 1973 and 1974 include data on the appreciated value of particular types of fixed capital employed in profit-seeking and budgetary sectors as well as appreciation coefficients measuring the ratio between the value of capital after and before the reevaluation. Using this NKh data, it is possible to determine the average annual value (unappreciated) of particular types of fixed capital for 1972. It can be assumed here that the structure of fixed capital changed in 1975 proportionally to appreciation coefficients. Old and new standard replacement and repair rates are quoted in Senchagov (1975), except for the service sector whose rates were derived independently.⁴⁶ These rates, average annual values of capital and appreciation (Appr.) coefficient are depicted in Table 4-3 on the following page.

**Table 4-3 STRUCTURE OF STATE AND COLLECTIVE CAPITAL
IN MID-1972, 1973 & 1975**

	<u>1972</u>	<u>1973</u>	<u>1972/1973</u>	<u>1975</u>	<u>Old Rates</u>		<u>New Rates</u>		<u>Appr</u>
					(A)	(B)	(A)	(B)	
Total	772	837	100.0	1090	3.2	3.2	3.6	2.7	1.12
Buildings	332	360	43.0	482	1.1	1.6	1.1	1.5	1.15
a) Prod	150	163	19.4	206	0.9	1.8	1.0	1.7	1.10
b) Services	52	56	6.7	84	1.0	2.0	1.1	1.9	1.28
c) Housing	130	141	16.8	192	0.9	1.4	1.0	1.3	1.16
Installat'ns	134	145	17.4	188	2.5	2.5	2.6	2.1	1.20
Transm. Gear	49	52	6.3	73	3.1	1.8	3.8	1.6	1.17
Mach. & Equip	163	177	21.1	216	6.9	6.0	8.2	5.1	1.03
Transp, etc	58	62	7.4	76	5.5	6.7	6.2	5.0	1.02
Tools	9	10	1.1	13	11.9	4.2	15.9	2.2	0.997
Gardening	5	5	0.6	6	2.7	0.2	3.2	0.4	1.00
Land Reclam.	2	2	0.3	3	8.6	0.7	10.9	0.5	1.00
Other	22	24	2.9	29					1.00

A = Replacement

B = Repair

In order to estimate depreciation of capital produced in construction and MBMW sectors it is necessary to multiply the average annual value of capital produced in these sectors by the corresponding depreciation rate.⁴⁷ Total construction repair works in state-collective sectors thus equaled 9.3 (2.6+1.0+1.7+3.2+0.8) billion rubles in 1972, 10.3 (2.9+1.1+1.9+3.5+0.9) in 1973, and 12.7 (3.5+1.6+2.5+3.9+1.2) in 1975. Total construction repair works, including the private and cooperative housing sector, equaled 10.2 (9.3+0.9), 11.3 (10.3+1.0) and 13.5 (12.7+1.8) billion rubles during the above years respectively. In order to obtain data on total repair works performed in production and service sectors, it is necessary to disaggregate the value of installations into these sectors using the ratio of 60:40. The latter can be derived by comparing the NKh tables on the structure of fixed capital stock in profit-seeking and budgetary services.

Data on the total value of construction repair works for the post-1975 period is based on the regularly published NKh tables containing data on the

structure of fixed capital employed in industrial and public agricultural sectors. For other sectors the structure of fixed capital changes insignificantly between reevaluations. Capital replacement is determined for each sector as the difference between total depreciation and capital repair.

Data on the value of MBMW repair works in civilian production and service sectors is estimated here as the difference between the derived total for capital repair and the value of capital repair works performed by construction and wood-working enterprises. The total depreciation of wood-working products is assumed to be 1 percent of the total depreciation, which is the same as the ratio between these products and the total fixed capital stock. In 1972, this depreciation amounted to 0.6 billion rubles, which is divided arbitrarily into replacement and repair funds using a 50:50 ratio. Replacement of fixed capital produced in the MBMW sector thus can be determined as a residual in the same way as the MBMW repair works.

4.4 CURRENT CONSUMPTION

Planners divide consumption of goods into private and public sectors. Private consumption includes retail trade purchases, depreciation of residential housing and other types of household consumption; utilities, consumption-in-kind, food packages, and in-village market purchases--which the authors of official statistical publications always conceal. The dearth of data on other consumption makes it difficult to estimate the total civilian consumption component of national income. Soviet economists prefer not to mention this fact and instead emphasize that households obtain most goods for final use at retail state-cooperative stores and at ex-village markets. Indeed, estimates presented in the end of this Section indicate that retail purchases currently constitute around 95 percent of the total household consumption of goods for individual use.

Public consumption consists of material and depreciation outlays of service sectors and the armed forces. The NKh for 1975 is the latest NKh edition which divides the consumption fund of national income into private and public components. It is not difficult to demonstrate that TSU officials conceal material outlays of the armed forces in the private consumption component of national income. TSU officials thus hypocritically treat the armed forces as part of the household sector. While consumption by the armed forces is discussed in Section 11, this Section focuses on current individual consumption and material outlays of service sectors.

4.4.1 Retail Trade

Basic Concepts. Retail trade turnover is divided into five parts: 1) industrial, agricultural and other consumer goods produced during the current year; 2) producer goods which are part of the intermediate product; 3) second hand goods which are excluded from current consumption; 4) household payments for construction and repair of residential housing facilities which are treated as capital outlays; and 5) movie tax, which is included in the trade GVO. Sales of secondhand goods (except for the trade surcharge) and those by private producers

at ex-village markets (except for sales to institutions) constitute monetary transfers within the household sector. The retail trade network also serves as a source of supply for a large number of nonproduction organizations serving households; dining institutions, collectives, a small number of state production enterprises and the armed forces. In order to avoid double counting of goods available for end use, it is necessary to divide retail trade purchases into those made by households and institutions.

Institutional purchases. According to Volkov (1968), organizations purchased 7 percent of all goods sold through the retail trade system in 1959 and 5.5 percent in 1966.⁴⁸ Zaitseva and Moroz (1971) provided the detailed report of institutional purchases for the second half of 1968 and the first half of 1969.⁴⁹ According to these authors, these purchases comprised 5 percent of total retail trade purchases, including 5.6 percent of the entire turnover of food products and 4.2 percent of non-food products. According to Kharlamov (1982), the total share of these purchases declined to 4.5 percent by 1980.⁵⁰ Given the fact that the structure of material outlays of service sectors changes slowly in the long run, it is possible to extrapolate the detailed data published by Zaitseva and Moroz for the rest of the observed period with an insignificant margin of error.

Institutional purchases first must be divided into those made by production and service sectors using the ratio of 25:75 derived with the data provided by the above authors. Their data clearly indicates that they had access only to the TSU survey of retail trade purchases made by civilian institutions. The relatively small increase of institutional purchases during the 1960's was caused by the decreasing participation of production enterprises. The annual increase in the volume of their purchases is assumed here to be no more than 0.1 billion rubles. In 1970, these purchases equalled 2.0 billion rubles. This amount was spent on agricultural products (0.4), food industrial products (0.4), MBMW products (0.3), fuels (0.4), and construction materials (0.4) and other products (0.1). All agricultural products were purchased by institutions at ex-village markets.

In 1970, purchases by service sectors equalled 5.9 billion rubles, of which food industrial products comprised around 70 percent. Although food products are consumed by the population at health, education and other social institutions, these products are part of material outlays. Using data on the structure of material outlays presented in Rutgaizer (1975), one can determine that service sectors obtain all their food products through the retail trade network.⁵¹ This conclusion makes it possible to estimate retail trade purchases of these products for the rest of the observed period. Purchases of other products increased insignificantly (0.1 billion rubles every 5 years).

The above conclusion also leads to a hypothesis that the armed forces purchase all food products through the retail trade system like other budgetary organizations. What seems to support this hypothesis is that the Gosplan manual and other Soviet sources limit the discussion of food supplies to the retail trade network.⁵² In contrast, Soviet sources divide supplies of light industrial goods (apparel, shoes, etc.) into supplies for retail and wholesale trade and special purposes. The latter includes uniforms for budgetary organizations, including the armed forces.

Another supporting piece of evidence is that in 1972 all food industrial products were purchased through the retail trade network. Data reported in Sorokin (1977) leads to the total consumption of light and food industrial products in the amount of 139.1 billion rubles.⁵³ As determined below, the retail trade purchases of light and food industrial goods for current consumption equaled 44.5 and 91.9 billion rubles respectively. The value of light industrial goods consumed by institutions equaled 2.1 billion rubles, of which retail trade organizations sold 0.4 billion rubles. Total retail and wholesale purchases of light and food industrial goods for current consumption then amounted to 138.1 (44.5 + 91.9 + 2.1 - 0.4) billion rubles. Purchases of light industrial goods by the armed forces thus equaled around 0.9 (139.1-138.2) billion rubles in 1972.

Certainly, this amount cannot include purchases of food industrial products by the armed forces. Since no data on these purchases has ever been revealed openly in the Soviet literature, some assumptions cannot be avoided. CIA analysts estimate that in 1970 military subsistence amounted to 2.0 billion rubles, including 1.4 and 0.6 billion rubles on food and uniforms respectively. Although CIA analysts do not disclose their estimation method, one can make a qualified guess that it is based on comparing the size of the armed forces with the size of the total USSR population. This author applied the same approach, first arriving at 1.8 billion rubles for 1970, and then accepted the average amount of 1.6 billion rubles. Further research into the subject of food consumption in the USSR can hopefully lead to more precise estimates.⁵⁴

Structure of total sales. Even though the NKh table on the retail trade is one of the most detailed and best organized, it is still necessary to transform the NKh data into the NEB format following instructions provided by Volkov (1968).⁵⁵ According to this Soviet source, such non-food products as soap, tobacco and cigarettes, and cosmetics are manufactured in the food industrial sector. The total turnover of agricultural produce includes sales of eggs, vegetables and fruits by state-cooperative stores, most sales being at ex-village farmers' markets (95 percent is assumed in this study). The cooperative sale of meats is purchased from private producers (0.3-0.5 billion rubles), and sales of agricultural produce is purchased by dining organizations (0.3-0.4 billion rubles) whose remaining output is treated as the end use of food industrial products.⁵⁶ Households also purchase feed, other agricultural materials and livestock, fertilizers and tools for production purposes. In the early 1970's all purchases of these goods, including the in-village markets, amounted to 1.0 billion rubles, including retail trade purchases of agricultural goods (30 percent) and fertilizers and tools (20 percent).⁵⁷

The total retail turnover of light industrial products includes sales of apparel, footwear, fabrics, haberdashery, rugs, and a small volume of other (sporting, toys, etc.) goods which are not itemized in the NKh table. A small part of haberdashery is produced by the metal works' sector as well as by other heavy industrial sectors. Thus, one can allocate the total sale of haberdashery goods to and exclude other goods from the light industrial sector without distorting the overall estimation results.

Sales of printed matter, construction services, and the forest and movie tax are registered separately from sales of industrial goods. The NKh table on the retail trade includes data on printed matter, while the NKh table on everyday

services covers construction and repair of residential housing in constant prices. Data in current prices can be found in Vestnik Statistiki for the period ending in 1972. Differences between the two sets of data established for the early 1970s are extrapolated for the rest of the observed period. The size of forest tax has remained on the same level of 0.5 billion rubles, of which 0.1 billion rubles is assumed to be collected from households.⁵⁸ The movie tax is determined in the next section using data provided by Rutgaizer (1975)--around 0.2-0.4 billion rubles.⁵⁹

The total retail turnover of heavy industrial goods is estimated here as the difference between the total turnover and the sum of all sales of agricultural, food and light industrial and other sectors' goods derived above. The MBMW products include automobiles, other equipment (other vehicles, bicycles, radio goods, electrical equipment, sewing and typing machines and production tools), metal works (metal-base beds and dishes and sporting goods). Repair of consumer goods is included in the total retail price of MBMW goods (the same applies to apparel and shoes). Typing machines are included together with office supply, while metal-base sporting goods are included together with sporting goods manufactured in wood-making and other heavy industries. Most typing machines are sold through the wholesale trade system. Only a limited supply of these machines reaches retail stores (less than 0.1 billion rubles).

It is assumed here that the ratio between sporting goods manufactured in the MBMW and wood working sectors is 40:60. Sales of production tools used in private agriculture and construction are assumed to increase from 0.2 to 0.3 billion rubles during the observed period. While the NKh table includes data on total sales of automobiles for the years 1965, 1970, 1975 and 1979 to present, data for other years can be derived as a residual after the estimation of all other sales. The cumulative value of other heavy industrial goods unidentified in the NKh table is first estimated as a residual for the above years. It is then assumed that during intervening years the value of these goods increased gradually every year by 0.1-0.2 billion rubles.

Furniture comprises most of the wood-making products handled by the retail trade system. Other products include matches, sporting goods, paper products and firewood. No data is available on the amount of furniture produced in other heavy industry, on firewood and on paper products, which are listed together with office supplies. It is assumed here that sales of firewood and paper products exceeds sales of furniture produced in other heavy industry by 0.1-0.2 billion rubles during the observed period. This assumption makes it possible to estimate total retail sales of wood and paper products.

Retail sales of fuels include coal, gasoline, and kerosene. Of the above sales, the NKh cover only kerosene (0.1 billion rubles). The approach proposed in this study combines the NKh data on household budgets, which includes the entry for consumption of fuels, and data provided by Zaitseva and Moroz on institutional purchases of fuels. According to Gallik (1983), retail sales of coal and gasoline to individuals amounted to 1.6 and 0.1 billion rubles respectively in 1972.⁶⁰ Results derived in the present study indicate that the total household consumption of fuels equaled 1.6 billion rubles during that year. Further research must

determine whether Gallik made an error in extrapolating data that was available to him in value terms for 1963 or whether published household budgets are imprecise.

Chemical products include detergents listed in the NKh table on the retail trade, also various rubber and asbestos products, paints and a number of other chemical products sold to households. According to Borisovich (1973), who is quoted by Gallik, households paid around 0.5 billion rubles for other chemical products in 1970.⁶¹ It is assumed here that this amount increased only by 0.2 billion rubles during the observed period. The value of rubber and asbestos products and paints is below 0.1-0.2 billion rubles due to the limited supply of these products made available to the general public.

Finally, the total retail sale of other heavy industrial products is estimated as a residual. The NKh table on the structure of retail trade includes data on sales of jewelry, musical instruments and toys. Other products include pharmaceuticals, medical instruments sold for private use, glass and china, photographic equipment, laundry and other production-type everyday services, and other heavy industrial products.

Current household consumption. The above division into sectors of production completed for both the entire retail trade turnover and for institutional purchases makes it possible to estimate household purchases. The latter exceeds current household consumption of goods purchased through the retail trade network by the sum of secondhand and producer goods. According to Volkov (1968), commission sales of secondhand goods comprised 0.3 percent of total retail sales in the mid-1960's.⁶² Assuming the the same ratio remained until 1970, commission sales then equaled 0.5 billion rubles during that year.

Lokshin (1981) reported that the value of new automobiles sold through the retail trade system equaled 0.52, 5.7 and 8.83 billion rubles in 1970, 1975 and 1980 respectively.⁶³ After comparing the above data with the NKh data, one estimates that commission sales of used automobiles increased from 0 billion rubles in 1970 to 1.5 billion rubles in 1975 and to 2.9 billion rubles in 1980. In percentage terms, commission sales of used automobiles increased from 26.3 percent in 1975 to 32.8 percent in 1980, which constitutes an average annual increase of 1.3 percent. The ratio of 3 percent reported by Volkov can be then applied to estimate commission sales of other secondhand goods, which increased from 0.5 to 1.2 billion rubles during the observed period. Apparel amounted to 60 percent of this amount, radio products were 30 percent, and other goods (books, etc) constituted the remaining 10 percent.⁶⁴

Producer goods include: agricultural goods (0.5 billion rubles), construction materials (1.2-1.6 billion rubles), forest tax (0.2 billion rubles), MBMW products (0.1-0.2 billion) and chemical products used in construction and agriculture (0.2-0.3 billion). It is assumed here that all asbestos products, most paints and construction materials are used for production purposes.⁶⁵

The household consumption of light industrial and MBMW products includes not only the value of purchased goods but also the value of alteration and repair services. Since no attempt is made in this study to disaggregate the unified balance of light industry into subsectors, the value of services is treated in the

same way as regular manufacturing of clothing shoes. In contrast, the MBMW sector is divided into machine-building, metal works and repair sectors. The value of repair services is obtained from the NKh tables on everyday services which includes data in constant prices. This data is compared with that published in current prices in *Vestnik Statistiki* for the early 1970's. The derived price conversion coefficient is then applied for other years.

4.4.2 Other Household Consumption

Since TSU officials refuse to publish information on other household consumption, the researcher has no other choice but to search for secondary Soviet sources. Fortunately, the latter revealed necessary information for a couple of years. This information then can be combined with the NKh data on the production of consumer goods and household budgets to derive data for the rest of the observed period.

Utilities. Household outlays on rent and all utilities--heating, water, gas and power--comprised 3.0 and 4.6 billion rubles in 1965 and 1970 respectively.⁶⁶ As noted in the Gosplan manual, payments for rent and heating cover, in part, expenses of the housing administration.⁶⁷ Thus, planners only include payments for water, gas and power in the household consumption component of national income. The share of rent and heating payments in total utility payments decreased from 69.5 to 67.3 percent between 1965 and 1970. Consequently, payments for water, gas and power increased from 0.9 to 1.4 billion rubles during the five-year period, which indicates an annual increase of 0.1 billion rubles. The same trend is continued for the rest of the observed period. In 1972, these payments amounted to 1.6 billion rubles, of which payments for power equaled 1.4 billion rubles.⁶⁸ Given the fact that payments for water are insignificant in size, payments for gas reached only 0.2 billion rubles in 1972.

Consumption-in-kind, etc. This type of consumption applies primarily to rural households. It includes consumption of agricultural and other goods produced in the private sector that are never exchanged for money, in-village sales of agricultural produce, and food packages paid in lieu of wages. An attempt is made in Section 3 to estimate agricultural consumption-in-kind as the difference between the agricultural GVO of private producers and the sum of commodity produce and non-commodity produce used for production purposes. These results are successfully tested in Section 7 on household budgets.

According to Zhurikov and Solomakhin (1973), monetary payments comprise around 94 percent of total wages paid to collective farmers.⁶⁹ It is assumed here that goods received by collective farmers for production purposes are approximately the same in size as agricultural consumer goods that are purchased at in-village markets. The margin of error is insignificant due to the small size of these goods. State farmers also receive some food packages, whose value is also quite small (0.1-0.2 billion rubles).

The estimation of consumption-in-kind in other production sectors is based on the structure of current consumption reported in Sorokin (1977). According to this source, consumption of goods produced in other sectors amounted to 1.2 percent (2.5 billion rubles) of the total current consumption (210.6 billion rubles) in

the 1972 input-output table.⁷⁰ Retail and wholesale trade of publications equaled 2.1 (2.0 + 0.1) billion rubles in 1972, while the movie tax is excluded from the input-output table. The value of privately produced goods thus equaled 0.4 billion rubles in 1972. It is assumed that the value of these goods did not exceed 0.5 billion rubles in the early 1980s.

4.4.3 Material Outlays of Service Sectors

The total volume of non-production services performed in the Soviet economy is discussed in detail in Section 6. The objective of the present discussion is to determine the structure of material outlays of service sectors using data reported in Rutgaizer (1975), and reproduced below in Table 4-4.⁷¹ The application of his data requires knowledge of total material outlays. The procedure proposed in Section 6 is based on estimating material outlays as the difference between the total volume of services and the sum of depreciation, wages, social security deductions and net profit.

Table 4-4 THE STRUCTURE OF MATERIAL OUTLAYS OF SERVICE SECTORS FOR 1970

	Household Services	Science and Administration
Total Outlays	100	100
Ferrous metallurgy	0.37	3.97
Non-Ferrous met.	--	5.24
Coal	3.97	3.26
Petroleum & Gas	4.24	3.23
Other fuels	1.54	--
Power	5.74	7.23
MBMW	4.65	43.02
Chemicals	5.61	11.56
Wood-making	2.64	5.13
Construct. Materials	0.92	6.42
Light	15.64	4.29
Food	37.60	0.70
Other Heavy Ind.	9.24	4.37
Agriculture	6.89	0.08
Other Production	0.95	1.50

Rutgaizer's informative study was never updated in the openly published Soviet literature. In fact, Soviet authors failed to discuss even general changes in the structure of material outlays of service sectors that took place after 1970. Published extracts from the 1972 input-output contain information on total consumption of goods produced in heavy industry, light and food industry, agriculture and other production sectors. The difference between total and individual consumption equals public consumption.⁷² The published input-output data combined with the derived data on individual consumption is hence useful for identifying public consumption of goods produced by the above five major sectors of the economy for 1972.

The problem, however, is the disaggregation of public consumption of these goods into consumption by service sectors and the armed forces. In addition, it is necessary to disaggregate total consumption of heavy industrial goods into sectors of production. In both cases, the input-output data appears useless. Western authors of the reconstructed input-output table supplemented the published input-output data with independent estimates of institutional retail trade purchases and public consumption of electrical power and gas.⁷³ They made no attempt, however, to account for public consumption of particular heavy industrial goods handled through the wholesale trade network.⁷⁴ As a result, they significantly distorted the structure of public consumption by assuming that goods handled through the retail trade network are primarily produced by other heavy industrial sectors (n.e.c.).

The approach proposed in this study is based on the belief that it is possible to make independent estimates of total current consumption in the economy and material outlays of service sectors. Total current consumption of industrial goods equals the difference between the total supply of Group "B" goods and the sum of these goods used as exports, investment, inventories, and reserves. Estimates of total consumption are presented in Table 2B2 in Volume II of this study. The estimation of data on the structure of material outlays of service sectors can be based on aggregating estimation results derived for particular groups of service sectors. These groups are: 1) education, culture and health, 2) T&C services for households, 3) science, and 4) housing-communal and administration services. Since information on total material outlays of these services has already been derived, the objective is first to transform and then update Rutgaizer's data with respect to these services.

As evident from Table 4-4 above, light and food industrial, n.e.c. (which primarily consists of pharmaceuticals) and agricultural products comprised 60 percent of total materials consumed by household services. Most of these products (more than 90 percent) are consumed by the first group. In turn, these products are estimated to comprise around 80 percent of total materials consumed by the first group in 1970. Published All-Republic budgets contain information on the structure of expenditures in the first group. The comparison of budgetary outlays on office expenditures, food products and uniforms indicates that the first group of services began to spend proportionally less and less on food and clothing compared to expenditures on heavy industrial products. Overall, the ratio between outlays on food and clothing and total material outlays of the first group appears

to have declined by 10 percent during the 1970s. Moreover, the decline appears to be gradual.

At this point, only two assumptions are necessary for deriving the structure of material outlays of the first group. The first assumption is that the trend for All-Republic budgets is the same as that for the entire first group. The fact that All-Republic budgetary financing equals 75 percent of total financing of the first group supports the above assumption. The second assumption is that the structure of retail trade purchases of heavy industrial goods is similar to the structure of total purchases of these goods by the first group, not counting pharmaceuticals which are estimated independently using All-Republic budgets. Since these heavy industrial goods comprise only 20-27 percent of total material outlays of the first group, the second assumption leads to an insignificant margin of error.

The structure of material outlays of T&C and science services resembles that of productive and MBMW sectors respectively. This observation makes it possible to estimate material outlays of these services using the type of analysis presented above in connection with changes in the structure of the intermediate product. It thus becomes possible to derive the structure of material outlays of the fourth group of service sectors for 1970 using Rutgaizer's figures as control totals. The derived structure is similar to that of the intermediate product of T&D sectors, not counting food products spoiled in the trade system. Changes in the structure of material inputs of the T&D sector and the fourth group of services hence can be assumed to be similar as well. In the end, total material inputs of service sectors are aggregated to derive total values of materials produced in particular sectors.

4.5 NET INVESTMENT AND PLANNED LOSSES

4.5.1 Objectives and Definitions

The Soviet concept of net investment applies to net fixed investment (NFI), net additions of unfinished construction, inventories and reserves.⁷⁵ TSU officials conceal material outlays of the defense production sector in the investment component of national income. The objective is first to identify the actual net investment and then to estimate defense material outlays as a residual.⁷⁶ What complicates the achievement of this objective is that starting in 1972 TSU officials changed the official statistical coverage of defense construction, while in 1976 they began to conceal the size of the NFI altogether.

Planners estimate the NFI as the difference between total additions to installed capital and its replacement value.⁷⁷ Total additions includes all completed construction works (except for capital repair works), installed machinery and equipment (M&E) financed by means of both capital investment and budgetary commissions, agricultural investment into gardening and livestock, as well as hotel's purchases of linen. The uninstalled capital equals the difference between total capital investment and additions to fixed capital financed by means of capital investment. Total capital replacement equals the sum of the replacement

fund and unamortized write-offs. While TSU officials divide the NFI into production and service sectors, planners distinguish between investment into civilian and defense production on the one hand and civilian and defense services on the other.

The analysis presented below leads to the conclusion that the NFI has always excluded weapon systems, military installations and other military goods. At the same time, the NFI has always included net additions of buildings, installations and M&E employed in manufacturing military goods product. It will be demonstrated that the investment residual included completed military installations before 1972. Since that year the investment residual has only included material inputs to manufacturing weapon systems. No attempt will be made to determine the structure of defense material inputs. This task is reserved for Section 11. Similarly, the disaggregation of the total NFI into particular production and service sectors is reserved for Section 10.

The analysis of the official Soviet statistical coverage of net investment and losses presented below follows one crucial theoretical precept which provides a base for the entire Soviet planning and accounting practice in the area of investment. According to this precept, only productive fixed capital is engaged in production of the GSP and national income. Likewise, the difference between total additions and replacement of productive fixed capital equals its net additions. The same principle applies to additions of production inventories. If one can demonstrate that the officially reported data on these additions applies only to productive capital, then one must conclude that these additions exclude defense capital altogether. This essentially limits any search for the defense capital to two sectors: T&C serving neither production nor household sectors, and administration. All budgetary commissions of M&E in defense industry are excluded from the NFI, regardless of whether commissioned M&E are used during one or more defense production cycles. Surprisingly, NKh editions include data that makes it possible to estimate the total for such commissions in constant prices. This must be considered as one of the more "generous gestures" on the part of TSU officials.

4.5.2 Net Fixed Investment (NFI)

Capital Investment. The fact that TSU officials changed their secret code in the area of defense construction can be demonstrated by comparing the independently estimated additions of capital and the NKh data on the NFI published till 1975. Capital investment consists of four parts: construction works, M&E, gardening and hotels' purchases of linen. Construction works are estimated in current prices in Section 3 as the difference between the total construction GVO and the sum of capital repair works and unfinished production. The NKh data on capital investment into M&E and gardening is converted from constant to current prices using the MBMW and agricultural price indexes also derived in Section 3. Hotel's purchases of linen constitute the only type of fixed capital produced in light industry. The available input-output data on Soviet republics' economies that was analyzed by Gillula (1984) indicates that these purchases equaled 0.2 billion rubles in 1972.⁷⁶ It is assumed here that these purchases did not exceed 0.3 billion rubles during the observed period. Total additions of fixed capital also include budgetary commissions of M&E, and additions of agricultural fixed capital in state collective and private farms that is excluded from capital investment.

Budgetary Commission of M&E. As published in All-Republic budgets, commissions of M&E increased gradually from 0.7 to 1.4 billion rubles during the 1970s. The analysis of budgetary financing of household service sectors indicates that the above commissions comprise more than 90 percent of all such budgetary commissions, which almost doubled in size from 0.8 to 1.5 billion rubles during the 1970s. Defense science organizations commission M&E with All-Union budgetary funds, which can be determined as the difference between total additions of capital in the science sector reported by Rutgaizer (1975) and capital investment into this sector estimated in Section 5.⁷⁹ Estimation results indicate that such commissions increased from 0.2 to 0.3 billion rubles between 1965-1973. The same trend is assumed here to continue in the post-1973 period. Total commissions thus increased from 1.0 to 1.8 billion rubles during the 1970s.

Agricultural Fixed Capital. The official statistical coverage of agricultural capital installation is limited to capital investment into gardening of public farms. The researcher is thus required to make independent estimates of additions to other types of agricultural capital. This includes public sector's productive livestock and private sector's capital. The NKh regularly includes data on the structure of capital in public agriculture, including collective and large state farms. Since these farms own 95 percent of productive livestock, total additions of public sector's productive livestock can be estimated with an insignificant margin of error. Data on private sector's capital can be found in only two NKh tables on productive capital and gardening in physical terms. The objective is to transform the NKh data on private farms into value terms.

The available information on privately owned capital in value terms is quite limited. It can be estimated that between 1973 and 1976 it remained 11.0-11.5 billion rubles.⁸⁰ According to Kuznetsova (1982), it grew 1.5 times between 1970-1982 and it consists of building (46%), productive livestock (31%) and gardening (23%).⁸¹ Assuming that privately owned capital equaled approximately 10 billion rubles in 1970 then, it equaled 15 billion rubles in constant prices and 16.5 billion rubles in current prices in 1982. This indicates average additions of 0.8 billion rubles between 1976 and 1982. In the beginning of the 1980s, privately owned capital consisted of buildings (7.6 billion rubles), productive capital (5.1 billion rubles) and gardening (3.8 billion rubles). By comparison, publicly owned productive livestock and gardening equaled around 25 and 9.0 billion rubles respectively. The ratio between private and public agricultural capital thus equaled 0.205 for productive livestock and 0.42 for gardening. The same ratios are estimated using the NKh data reported in physical units. The researcher is, therefore, justified to use this NKh data for deriving additions of privately owned capital first in physical and then in value terms.

Net Additions. Total additions exceed net additions of fixed capital by the sum of net additions of unfinished construction, investment write-offs and the total value of replaced capital, including unamortized write-offs. The NKh regularly includes tables on capital investment and additions of capital in constant prices. The difference between totals reported in these tables equals the sum of unfinished construction and investment write-offs, which can be converted from constant to current prices using the derived construction index. Unfinished construction in the collective sector also can be estimated as the difference

between this sector capital investment and additions of capital that are regularly reported in the NK Unfinished construction in the state-cooperative sector is regularly reported the NKh in current prices. Investment write-offs thus can be estimated as a residual. The total value of replaced capital was estimated earlier in this Section.

Table 4-5 below compares the NFI derived above and that reported in the NKh table on the investment fund of national income. The comparison (see line 16) indicates the discrepancy for the period ending in 1971. No such discrepancy can be observed for 1972-1975. This indicates that in 1972 TSU officials changed the method of concealing defense capital outlays.

Table 4-5 NET FIXED INVESTMENT (NFI)

	<u>1965</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
1. Total NFI	27.9	51.1	53.7	55.2	60.2	62.6	62.1
2. Capital Replacement	16.7	25.6	27.5	30.1	33.5	35.4	42.2
3. Total Additions	53.5	88.3	92.9	93.9	97.9	104.3	111.3
4. a) Construction	34.1	58.1	63.0	62.3	65.0	69.1	74.5
5. b) M&E investment	17.5	27.2	26.8	29.0	29.6	31.7	33.7
6. c) M&E commissions	0.5	1.0	1.0	1.1	1.2	1.3	1.4
7. d) Agriculture	1.3	1.8	1.9	1.3	1.9	2.0	1.5
8. -/- gardening	0.2	0.4	0.4	0.4	0.5	0.5	0.3
9. -/- livestock	1.1	1.4	1.5	0.9	1.4	1.5	1.2
10. e) Light Industry	0.1	0.2	0.2	0.2	0.2	0.2	0.2
11. Uninstalled Capital	4.0	6.0	7.2	8.6	4.2	6.3	7.0
12. a) Unfin. Construct'n	3.0	4.5	6.0	7.8	2.4	5.1	5.6
13. b) Invest't Write-offs	1.0	1.5	1.2	0.8	1.8	1.2	1.4
14. 1 + 2	44.6	76.7	81.2	85.3	93.7	98.0	104.3
15. 3 - 11	49.5	82.3	85.7	85.3	93.7	98.0	104.3
16. 15 - 14	4.9	5.6	4.5	0.0	0.0	0.0	0.0

The researcher must consider three sets of possibilities: 1) additions of capital include or exclude armaments and other military MBMW products; 2) additions of capital include or exclude military installations (missile silos, military sea and airports, defense transportation and communication lines, civil defense facilities, etc.) produced in the construction sector; and 3) the NFI includes all, some or none of the above.

Changes of 1972. It seems that there is only one available method for deciding which of the above possibilities are valid. This method is based on comparing the NFI with net additions of the undepreciated capital stock which is reported in the NKh for the beginning of each year. Net additions of undepreciated capital exceed the NFI by the difference between replacement and liquidation of capital stock, which can be estimated using data reported by Rutgeizer (1975) and published in the NKh.⁸² The unappreciated value of the total capital stock in current prices equaled 692.6, 758.4, 826.1 and 897.8 billion rubles in January 1970, 1971, 1972 and 1973, while the appreciated value of this capital in current prices equaled 924, 1002, 1083, and 1165 billion rubles for January 1972, 1973, 1974 and 1975 respectively.

Net additions of undepreciated capital then equaled 66, 68, 72 (78), 80, and 82 billion rubles in 1970, 1971, 1972, 1973 and 1974. These net additions exceeded the NFI by 15, 14, 17 (23), 20, and 20 billion rubles respectively, which are smaller than the replacement values for these years by 9, 12, 11 (4), 12, and 15 billion rubles. These amounts are in effect values of liquidated capital. The reason why it equaled 12 rather than 10 billion rubles in 1971 is that the inordinate amount of capital was retired during the reevaluation of capital stock operated by profit-seeking enterprises. It can be safely assumed that the value of liquidated capital equaled 11 rather than 4 billion rubles in 1972. The anomalous results derived for 1972 using the NKh data can be explained by the fact that the value of capital stock as of January 1972 should have equaled 931 rather than 924 billion rubles. The discrepancy was caused by the fact that capital of profit-seeking enterprises was reevaluated in 1971, while that of budgetary organization was reevaluated in 1972.

According to Rutgaizer (1975), the total liquidated capital of service sectors equaled 3 and 4 billion rubles in 1970 and 1971 respectively.⁸³ Since capital of service sectors comprised 37 percent of the entire capital stock, the derived total for liquidated capital would have amounted to 8 and 11 billion rubles respectively for these two years, if one is to assume the same structure for all sectors' capital stock. In reality, M&E, which have a higher liquidation rate than buildings and structures are primarily employed in production sectors. This explains why liquidated capital of production sectors is disproportionately larger than that of service sectors.

Total additions of capital equaled 75 (66+9) billion rubles and 80 (68+12) billion rubles in 1970 and 1971 respectively, which are smaller by 3.8 and 3.3 billion rubles than total additions of capital estimated here as the sum of construction, MBMW and other sectors output. By comparison, no discrepancy can be found for 1972-1975. The "excessive" capital derived as a residual for 1965-1972 is assumed here to represent defense construction. This assumption is supported by the fact that the construction price index estimated as the ratio of construction works in current prices and construction works included in capital investment in constant prices dropped by 7 percent in 1971-1972. All evidence thus suggests that in 1972 TSU officials decided to conceal "excessive" capital outlays either by excluding them from the construction GVO altogether or by treating them as additions to unfinished production in the construction sector. The latter are treated as additions to inventories in national income accounts.

There are two reasons why TSU officials decided to artificially increase unfinished construction. First, the results presented below indicate that the defense investment residual estimated as the difference between total investment fund and the sum of the NFI and additions to inventories, reserves and unfinished construction declined dramatically by 4.0 billion rubles in 1971-1972. No such break in continuity in the defense residual would be found if additions of inventories (more precisely unfinished production in the construction sector) were reduced by the amount of defense construction. Second, if TSU officials decided to exclude defense construction from GSP accounts, then one would detect discontinuity in the official statistical coverage of labor employed in the construction sector among other indicators measuring construction activities. Since no such discontinuity can be found, one must conclude that defense construction, unlike the defense industry, remained within the GSP accounts.

The reason why TSU officials decided to change their secret code is not difficult to find. The reevaluation of capital in 1971 and 1972 required the publication of capital stock in current prices for the first time in almost two decades. When 1955 prices were introduced, the TSU secret code was not yet established--the first post-war NKH edition was published only in 1957. If TSU officials did not change their secret code in 1972, then all Soviet economists would have recognized the discrepancy between total additions of capital and the construction GVO. In addition, TSU would have been unable to publish the first detailed input-output balance of productive fixed capital for 1972, which had an important function of helping Soviet economists to analyze capital productivity in particular sectors. Finally, the investment residual was becoming too large in the beginning of the 1970s. The new secret code made it possible to significantly reduce this residual in 1972, which peculiarly coincided with the publication of the input-output table. When the new secret code became insufficient in the mid-1970s, TSU officials began to conceal the NFI altogether.

Defense NFI. The fact that published data on the industrial capital excludes not only weapons but also defense production capital can be ascertained by estimating capital of the industrial sector engaged in the production of GSP and national income. Since defense industrial capital is not engaged in the production of the GSP and national income, then its depreciation must be excluded from national income. Thus, only depreciation of the civilian production capital is excluded from national income. According to Garbuzov (1984), only 2 percent of the industrial capital is not depreciated.⁸⁴ This capital equaled 5 billion rubles in 1972, while the value of depreciated capital was 261 (266-5) billion rubles. Total depreciation deductions in the industrial sector comprised 19.5 billion rubles in 1972, which presupposes a depreciation rate of 7.5 percent. The same rate is reported for the industrial sector for this year in Senchagov (1975) and other Soviet sources.⁸⁵ The same procedure can be repeated for other years of the observed period. This procedure in a way tests the validity of the independently estimated depreciation in the civilian industrial sector.

There are only two sectors where the defense production capital can be possibly found: T&C and administration sectors. It would be incorrect to argue that the "excessive" capital found in the T&C sector can be simply explained by the fact that highways, bridges and other installations constitute part of the T&C

network and are maintained with funds drawn from the state budget. The existing evidence points out that city roads and bridges are supervised by the communal sector, while roads used for production purposes are supervised by the appropriate production sector.⁸⁶ The remaining roads--interstate highways--are supervised by the road administration.

No Soviet source has ever specified what type of services are offered by those T&C sectors that are not engaged in production and household service activities. This lack of knowledge on the part of Soviet authors is not surprising if one, on the basis of deductive reasoning, determines that capital operated by Soviet space program agencies and by defense T&C sectors cannot be hidden in any other place but in the total for all T&C sectors. How can T&C organizations serve any other mysterious science and administration purpose? Indeed, no answer can be found to this question. Western observers usually assume that capital outlays on the Soviet space effort are hidden together with outlays on science. However, Western researchers have not paid attention to the fact that total additions of capital in the science sector averaged only 1 billion rubles during 1963-1973, the period of the most intensive space effort. Nor have they paid attention to the fact that the entire capital stock of the science sector reached only 13 billion rubles in 1973.

It is unclear how one can disaggregate the "excessive" capital of the T&C sector into capital operated by civilian and defense T&C agencies. In effect, such a disaggregation procedure may not be necessary for the purposes of this study because it is widely accepted that most Soviet space effort serves defense rather than civilian needs. It is arbitrarily assumed here that at least 80 percent of this "excessive" capital is used for defense purposes. It is also unclear as to whether Soviet planners themselves have a definite approach to separating investment into civilian and defense space programs. Considering that planners lack resources to disaggregate investment into civilian productive and service T&C sectors on the annual basis, it would not be surprising to learn that planners make no effort to divide the total value of space installations into civilian and defense components.

There is one peculiarity about the structure of capital investment into the administration sector that may help determine defense capital hidden together with other capital of these sectors. As estimated in Section 5, investment in these sectors into M&E almost tripled during 1970-1983 from 1.1 to 3.1 billion rubles, whereas these sectors' total capital investment doubled from 2.5 to 5.0 billion rubles--all in constant prices. Most capital of the administration sector, however, consists of buildings and installations.

This paradox of the official statistics has no other explanation outside the most obvious fact that TSU officials conceal some investment into defense sector in the total for the administration sector. It thus follows that capital stock of the administrative sector includes a substantial part that serves defense needs. What supports this assumption is that neither Soviet authors nor TSU officials provide data on capital outlays of the administration sector. Instead, they refer to a mysterious group of sectors called "other non-productive sectors", of which administration comprises only a part. In the same vein, the authors of the Gosplan manual discuss capital investment into all sectors of the economy, except for administration.

Although capital investment into M&E by administrative organs is too small to include weapon systems, it is not too large to exclude various M&E installed in defense industrial enterprises. It is estimated here that capital of the administration sector equaled 25 percent of the official total for this sector during 1972-1974. The remaining 75 percent must consist of defense industrial facilities, which in January 1973 thus amounted to 16 billion rubles (21*.75). This amount excludes M&E commissioned by defense industrial enterprises, registered as part of their material outlays.

Fixed capital of the military administration consists of housing-communal, education, health, and administration facilities whose value cannot be determined with any precision. It is assumed here that around 90 percent of the entire housing stock of budgetary organizations (6-8 billion rubles) is used for defense purposes. The military use of other service facilities is assumed to be proportional to the share of the armed forces in the Soviet population.

Commissions of Defense M&E. If one can demonstrate that defense production enterprises commission M&E, then one offers another proof that these enterprises are budget-supported and that the end military product is excluded from the GSP and national income. The NKh regularly includes a note in the bottom of the table on the structure of capital investment. The notes state that the NKh data on capital investment excludes: capital outlays connected with budgetary allocations on geological exploration and urban construction design works, forest development, formation of livestock, as well as budgetary commissions of M&E. Both Soviet and Western economists unjustifiably ignore this note, apparently for the reason that it makes little sense to those who believe that defense production enterprises earn profit.

In 1980, total capital outlays, including the above capital outlays, equaled 150 billion rubles, while capital investment equaled 133.5 billion rubles. Both of these figures are quoted in constant prices. The above capital outlays then equaled 16.5 (150-133.5) billion rubles, including geology (3.1), forest development (0.7), construction design (0.2), livestock (1.0), and budgetary commissions of M&E estimated as a residual (11.5).⁸⁷ Using budgetary statistics one determines that service sectors commissioned M&E in the amount of 2.1 billion rubles (1.8 billion in current prices). Derived as residual, the value of M&E commissioned by defense production enterprises amounted to 9.4 billion rubles in constant prices in 1980. This figure is certainly too small to include weapons but too large to exclude capital goods used in defense production.

4.5.3 Inventories and Reserves

Definitions. Inventories and reserves can be analyzed from both organizational and production perspective. While inventories are stockpiled for maintaining a continuous supply of goods for production and consumption purposes, reserves are created for emergency needs.⁸⁸ Most inventories of producer goods are stockpiled by production enterprises. Supply and procurement agencies store only a limited amount of production inventories that are either in transit or need repackaging. The reverse situation exists with respect to commodities of producer goods which are stockpiled primarily by supply and procurement

agencies. When the latter have insufficient storage facilities, enterprises are obliged to store reserves themselves. Supply and procurement agencies, however, continue to exercise administrative control over the entire stockpile of reserves. Most inventories of consumer goods are stockpiled by production enterprises, retail and wholesale trade organizations. Production enterprises primarily store unused goods, retail organizations store goods that are sold mostly to households, and wholesale trade organizations store goods that are sold mostly to service and defense sectors. The latter keep only a very limited supply of inventories that are required to meet their immediate needs.

One exception is apparently the armed forces which are allowed to maintain extensive supplies. Supply agencies provide the armed forces with fuels and other capital goods, whereas wholesale trade organizations provide them with light, food, and other industrial consumer goods. Procurement agencies in turn supply agricultural produce. The USSR Defense Ministry administers an extensive network of retail trade facilities serving members of the armed forces. The procedure for storing inventories in these facilities is no different from that existing in other retail trade networks. Similarly, defense production enterprises apparently follow the same regulations in maintaining inventories as civilian production enterprises.

Planners divide production inventories into raw, main and auxiliary materials; fuels, tare, spare parts, tools and instruments excluded from the fixed capital stock; seeds, fodder, young livestock and other agricultural materials; unfinished production in industry, construction, agriculture and forestry; expenditures for future periods; finished goods remaining at storages of production enterprises; and other inventories which are of insignificant size. Inventories of producer and consumer goods that are not used for production purposes are grouped under the category of commodities. The structure of commodities stored by retail trade organizations and production enterprises largely resembles that of the retail trade turnover, while the structure of inventories of wholesale trade organizations resembles that of annual wholesale purchases of non-production sectors. Annual additions to inventories of food stored by households are insignificant in size and will be ignored for the purposes of this study.

The total stockpile of reserves consists of state and strategic reserves. State reserves, which primarily serve civilian needs, are created as a safety valve to protect the Soviet economy from the consequences of significant production failures. These reserves are used only with permission of the USSR and All-Republic Councils of Ministers.⁸⁹ While state reserves are included in the NKH table on inventories and reserves, strategic reserves are excluded from this table. Soviet authors note that strategic reserves are created to supply the Soviet population and the armed forces with consumer and producer goods during the initial period of war. In reality, annual fluctuations of war reserves are quite insignificant in size. The major purpose of stockpiling strategic reserves is the supply of defense production enterprises with materials and subsystems for weapons production. Planners apparently divide strategic reserves in the same way as they divide stockpiles of goods for civilian purposes, which are: 1) for current use; 2) for meeting production needs in the immediate future; and 3) for emergency purposes. Stockpiles of armaments -- a separate part of strategic

reserves -- lie outside the scope of the GSP accounts and hence are completely excluded from the official statistics.

No information has ever been revealed on the size or structure of state reserves. What can be gathered from various hints provided by Soviet authors is that state reserves include agricultural raw materials (primarily grain), fuels, MBMW and food products and a relatively small quantity of other industrial materials. It is debatable whether planners register gold reserves as non-ferrous metal products or simply as monetary reserves. In the first case, the value of gold reserves would equal the price paid by state reserve organizations to gold mine enterprises. In the second case, gold reserves would reflect the ruble's gold standard. Unless gold serves as a standard of monetary measurement, its value must be determined by production, transportation and storage cost, i.e., the value entered on the GSP accounts. In this study, state reserves are estimated as the difference between total commodities in reserve and inventories of commodities.

Collection of Data Base. The NKh regularly includes financial tables on inventories of major state-cooperative sectors, on sources of financing inventories by sector, and on the structure of inventories for the entire state-cooperative sector, industry, agriculture, construction, and trade. Since these tables are extracted from financial balances, their coverage of economic sectors follows principles of financial accounting. Similar to other financial tables, these tables thus include other construction organizations that do not maintain independent banking accounts together with other sectors.

Data on inventories of collective farms can be found in the NKh table on these farms' capital. The TSU officials conceal inventories together with the non-agricultural production fixed capital of collective farms. Data on this fixed capital, however, can be found in Gusev (1982) for several years.⁹⁰ Due to the fact that this capital grew slowly during the 1970's, data found in this Soviet source can be extrapolated for other years with an insignificant margin of error. The same source also provides information on the structure of collective farms' inventories for several years.⁹¹ The change in the structure of inventories of collective farms during these years are compared with that of state farms to establish quite similar trends. The use of the NKh data on state farms is thus justified for the derivation of data on collective farms for intervening years. The ratio between additions of livestock in private and public farms is assumed to be the same as the ratio between additions of productive livestock in these farms.

The NKh tables on inventories contain data on total commodities, including those stored in industry and trade. In the end of 1975, this total equaled 81.8 billion rubles, including 52.7 in trade and 2.3 in industry. The residual (26.8) consists of commodities stockpiled by supply, procurement, service and defense sectors. Data on inventories of commodities also can be found in the NKh section on domestic trade activities. In the end of 1975, total inventories of commodities listed in this section equalled 58.1 billion rubles, including 45.4 in retail trade and 12.7 in wholesale trade and industry. Assuming that the NEB and financial reports are quite similar in the area of commodities stockpiled in industry, then wholesale trade stockpiles equalled 10.4 (12.7-2.3) billion rubles in 1975.

The difference between two NKh presentations of commodities stockpiled in the trade sector ($3.0=45.4+10.3-52.7$ in 1975) has never been mentioned in the openly published Soviet literature, at least to the knowledge of this author. It is assumed here that the above difference equals inventories of commodities stored in subsidiary trade and industrial enterprises as well as in non-production sectors, including the armed forces. The total value of stockpiled reserves then can be estimated as the difference between the total for commodities and the total for inventories of commodities ($23.7=26.8-3.1$).

There are many difficulties involved in disaggregating inventories of production materials into sectors of their production. During the 1970's, annual additions of inventories of materials ranged from 2.1 billion rubles in 1971 to 4.9 billion rubles in 1980, averaging 3.3 billion rubles during the 1970's. It is assumed here that light and food industries store an insignificant amount of additional inventories of agricultural raw materials due to their limited storage facilities. The objective therefore is to disaggregate annual additions of inventories into sectors of industrial production. Since the disaggregated data is available for only several years, this author decided to base the disaggregation procedure on the estimation results performed in connection with the structure of the intermediate product. What justifies this procedure in addition to its efficiency is that even the margin of error approaching 20 percent in value terms does not exceed 0.2 billion rubles. Moreover, it seems logical that the structure of consumed materials (excluding intra-industry flow) approximates the structure of inventories of these materials remaining in stock by the end of the year.

NKh editions published before 1976 include the table on the structure of commodities stockpiled by retail trade organizations. This data can be combined with the data on the structure of material outlays of service sectors derived above to estimate additions of inventories of consumer goods by sector of their production. The margin of error is insignificant because retail trade inventories have comprised around 85 percent of all these inventories. During the period of 1976-1979 annual additions of all inventories of consumer goods averaged only 1.1 billion rubles. Data derived for the pre-1976 period hence can be extrapolated for the 1976-1979 period with an insignificant margin of error.

The NKh for 1980 was the last edition that included the table on the structure of inventories and reserves. Assuming this structure changed little during 1980-1981, data for 1981 can be derived by continuing the trend established during the late 1970's. Price changes introduced in 1982 require a different procedure for obtaining precise estimates. This author, however, had an insufficient data base for developing this procedure. Particularly puzzling is the unexpected jump in inventories of commodities--5.1 billion in 1980, 8.3 billion in 1981 and 9.6 billion in 1982. Further research is required to understand the TSU decision to stop publishing data on the structure of inventories and reserves for the Eleventh Five-Year Plan and how this decision is connected with the new Soviet policy of withholding immense stockpiles of consumer goods, which are in short supplies, from households. In the absence of such a policy one can only explain the existence of these stockpiles by the increasing unwillingness of Soviet people to purchase poor quality goods. Equally large increases of household savings during the same period partially validates the latter hypothesis.

The lack of available data also prohibits the estimation of reserves of particular industrial goods. While annual additions of reserves of agricultural raw materials are estimated in Section 3, total additions of reserves of industrial goods are estimated here as a residual. The latter is then arbitrarily divided into MBMW, fuels, metal and food products using the ratio 50:20:10:20 for years that were successful for the Soviet agriculture and hence for the food industry. The percentage share for food products declines during "bad" years.

4.5.4 Planned Losses

The economic nature of planned losses is essentially the same as that of reserves that are used for current production needs and that hence cause the decrease of the total stockpile of reserves. Planned losses are registered only in agriculture and construction. Agricultural planned losses consists of spoiled agricultural raw materials, losses of livestock and some other capital losses covered by state insurance premiums. Construction losses consist of abandoned construction sites that decrease the total volume of unfinished construction.

Total planned losses are estimated here using the national income statistics. The difference between the produced national income (PNI) and national income available for end use equals the sum of total planned losses and the balance of foreign currency earnings estimated in domestic rubles. The latter are estimated in Section 8 as the product of total exports in gold rubles (total imports when the balance is negative) and the conversion coefficient. Total planned losses are then estimated as a residual. Estimation results indicate that these losses ranged from 3 to 5 billion rubles during the 1970s. By 1983, these losses reached 6 billion rubles. Soviet authors have never published any data on the size of agricultural and construction losses. The researcher therefore must find an independent procedure for disaggregating the total with the least margin of error.

While Soviet authors publish information on the balance of state insurance premiums in finances of collective and state farms, no data is available on losses of agricultural raw materials during procurement, transportation and storage. It seems that the researcher has no other alternative but to explore the possibility of deriving the value of abandoned construction sites. Theoretically, this value must equal the difference between total additions of unfinished construction and net additions registered in the end of the year. As discussed above in connection with the NFI, investment write-offs equal the difference between total investment and the sum of net additions of capital and unfinished construction. Investment write-offs thus appear to be approximately the same in size as construction losses. This approach leads to credible estimation results for all years, except for 1970-1971 when investment write-offs amounted to -0.4 and -0.8 billion rubles. The explanation for such paradoxical results obtained for these two years is presented in Section 3. Actual amounts for these two years were 1.5 and 1.3 billion rubles.

END NOTES

¹ For informative commentaries in this area refer to L. Gol'denberg, and V. Petrov, "Raschot I i II Podrazdeleniy i Stoimosti Struktury Obshchestvennogo Produkta," *Vestnik Statistiki*, No. 9, 1983, pp. 30 - 31; and M. Eydel'man, "Kak Otrazhaetsa v Mezhotraslevom Balanse Kapital'nyi Remont Oborudovaniya," *Vestnik Statistiki*, No. 4, 1968, pp. 56 - 61. For the discussion of how planners register subsidiary production activities refer to L. Gol'denberg, "Yedinovremennoe Obsledovanie Zatrata na Proizvodstvo Produktsii na Promyshlennykh Predpriyatiyakh," *Vestnik Statistiki*, No. 12, 1977, p. 61.

² U. S. Department of Commerce, *Input-Output Structure of the Soviet Economy: 1972*, by D. Gallik, B. Kostinsky, and V. Treml, Foreign Economic Report, No. 18, (Washington, D.C.: Government Printing Office, 1983). Also refer to A. Granberg, *Matematicheskie Modeli Sotsialisticheskoi Ekonomiki*, (Moscow: Ekonomika, 1978), pp. 249 - 253, the NKh for 1973 which includes excerpts from the 1972 input-output table, and to *Vestnik Statistiki*, No. 11, 1968, p. 90, which includes excerpts from the 1966 table.

³ Total subsidies equaled 16.6 billion rubles, while added taxes equaled 1.5 billion rubles.

⁴ L. Gol'denberg, "Voprosy Razrabotki Mezhotraslevykh Svyazey v Promyshlennosti," *Voprosy Ekonomiki*, No. 12, 1980, p. 28.

⁵ A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov*, (Moscow: Finansy, 1976), p. 142.

⁶ S. Heinman, and D. Palterovich, eds., *Nauchno-Tekhnicheskii Progress i Struktura Proizvodstva Sredstv Proizvodstva*, (Moscow: Nauka, 1982), p. 26.

⁷ V. Dryuchin, "Sel'skoe Khozyaistvo v Narodnokhozyaistvennom Balanse," *Vestnik Statistiki*, No. 6, 1979, p. 17.

⁸ V. Senchagov, et al., *Amortizatsyonnyi Fond V Usloviyakh Intensifikatsii Proizvodstva*, (Moscow: Finansy, 1975), p. 175. According to G. Verbov, *Bukhgalterskiy Uchot v Promyshlennosti*, (Moscow: Finansy, 1973), p. 136, enterprises are not required to make depreciation payments for all capital held in reserve. Since the term "reserve" is often applied to economic resources allocated for defense purposes, the decree quoted by Verbov could be applied to capital operated by defense industrial enterprises.

⁹ N. Parashutin and Ye. Kozlova, *Kurs Bukhgalterskogo Uchota*, (Moscow: Finansy, 1977), p. 182.

¹⁰ Senchagov, p. 124.

¹¹ Ibid, p. 124. As listed in the NKh 1973, p. 60, total fixed capital was appreciated by 12 percent.

- ¹² Ibid, p. 166
- ¹³ S. Pokropivnyi, *Ekonomika Promyshlennogo Proizvodstva*, (Kiev: Tekhnika, 1982), p. 222.
- ¹⁴ See L. Khorunzhiy, *Amortizatsionnyi Fond*, (Moscow: Ekonomika, 1972) for the analysis of this problem.
- ¹⁵ Planners must make this transformation because all their planning capital depreciation is based on the financial system of accounts.
- ¹⁶ Senchagov, p. 25.
- ¹⁷ V. Garbuzov, ed., *Finansovo-Kreditnyi Slovar': Vol. 1*, (Moscow: Finansy, 1984), p. 39.
- ¹⁸ A. Notkin, ed., *Factory Ekonomicheskogo Razvitiya SSSR*, (Moscow: Ekonomika, 1970), pp. 72 - 73.
- ¹⁹ Senchagov, pp. 31, 178.
- ²⁰ Garbuzov, p. 40.
- ²¹ I. Malyi, and V. Sis'kov, eds., *Kurs Statistiki Promyshlennosti*, (Moscow: Statistika, 1978), p. 194, and M. Nazarov, ed., *Kurs Sotsial'no-Ekonomicheskoi Statistiki*, (Moscow: Finansy i Statistika, 1982), p. 108.
- ²² Garbuzov (1984), p. 40.
- ²³ A. Tretyakova, and B. Kostinsky, *Depreciation in the 1972 Input-Output Table*, Working Paper (Washington, D.C.: U.S. Department of Commerce, Bureau of the Census, 1983), p. 5.
- ²⁴ A. Masal'skiy, "K Voprosu o Nachislenii i Ispol'zovanii Amortizatsii," *Finansy SSSR*, No. 4, 1974, p. 44.
- ²⁵ Volkov, p. 93.
- ²⁶ Senchagov, p. 103.
- ²⁷ V. Kochkarev, *Rol' Kredita v Povyshenii Effektivnosti Kolkhoznogo Proizvodstva*, (Moscow: Finansy, 1977), p. 79.
- ²⁸ See Table 4B1 in Volume II of this study.
- ²⁹ Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), p. 203.
- ³⁰ Senchagov, p. 103.

³¹ Ibid, p. 178.

³² Ibid, p. 155

³³ See Parashutin and Kozlova, pp. 377 - 379.

³⁴ D. Molyakov, ed., *Finansy Predpriyatiy i Otrasley Narodnogo Khozyaistva*, 3rd edition, (Moscow: Finansy i Statistika, 1983), p. 280.

³⁵ G. Shmelev, *Lichnoe Podsobnoe Khozyaistvo i Ego Svyazi s Obshchestvennym Proizvodstvom*, (Moscow: Mysl', 1971), p. 258

³⁶ Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*, (Novosibirsk: Nauka, 1981), pp. 75 and 198 - 199.

³⁷ V. Rutgaizer, *Resursy Razvitiya Neproizvodstvennoi Sphery*, (Moscow: Nauka, 1977), p. 154.

³⁸ Senchagov, p. 124.

³⁹ M. Barun, *Spravochnik Po Finansovo-Ekonomicheskim Raschotam*, 2nd Edition, (Moscow: Finansy, 1971), pp. 196 - 197.

⁴⁰ These figures are derived using data on total repairs in these sectors and on total budgetary financing of these sectors.

⁴¹ T. Ryabushkin, *Teoriya i Metody Ekonomicheskoi Statistiki*, (Moscow: Nauka, 1977), p. 394.

⁴² For information on these liquidation rates refer to V. Rutgaizer, p. 152.

⁴³ Rutgaizer, p. 157.

⁴⁴ Senchagov, p. 25.

⁴⁵ The disaggregation into repair and replacement components is based on the analysis of capital stock presented in Section 10 where it is suggested that depreciation of capital operated by defense industrial enterprises constitutes 75 percent of total depreciation in the administration sector.

⁴⁶ Senchagov, p. 124.

⁴⁷ Senchagov, pp. 179 - 180, observes that actual rates for buildings exceed planned rates, while actual rates for machines are smaller than planned rates. Unfortunately, he provides insufficient information for basing calculations on actual rather than planned rates.

⁴⁸ A. Volkov, "Fond Lichnogo Potrebleniya v Staticheskome Mezhotraslevom Balanse Obshchestvennogo Produkta", *Ekonomika i Matematicheskie Metody*, Vol. 4, No. 5, 1968, p. 723.

⁴⁹ A. Zaitseva, and P. Moroz, "Izuchenie Vyborochnym Metodom Pokupok Tovarov Organizatsiyami, Uchrezhdeniyami i Predpreyatiyami Roznichnoy Seti i na Kolkhoznom Rynke," *Vestnik Statistiki*, No. 5, 1971, p. 33.

⁵⁰ A. Kharlamov, et al., *Statistika Sovetskoi Torgovli*, (Moscow: Ekonomika, 1982), p. 97.

⁵¹ Rutgaizer, p. 168.

⁵² See Gosplan (1974), pp. 510 - 511, and P. Lokshin, *Spros Proizvodstvo Torgovlya*, (Moscow: Ekonomika, 1975), pp. 84, 119 and 129.

⁵³ See Gallik, et al., p. 4, for the derivation of this figure.

⁵⁴ One such approach can be based on extensive interviews with Soviet emigres who served in the armed forces and who can remember the daily intake of food.

⁵⁵ Volkov (1968), pp. 726 - 730.

⁵⁶ This is based on Volkov (1968), p. 728.

⁵⁷ U. S. Central Intelligence Agency, *USSR Gross National Product Accounts, 1970 Research Aid*, A (ER) 75-76, November, 1975, p. 24.

⁵⁸ The fact that households pay the forest tax is mentioned in Volkov (1968) p. 727.

⁵⁹ Rutgaizer, p. 200.

⁶⁰ Gallik, et al., pp. 18 - 19.

⁶¹ Ibid, p. 33.

⁶² Volkov (1968), p. 726.

⁶³ P. Lokshin, "Stoimost' i Struktura Roznichnogo Tovaroooborota," *Voprosy Ekonomiki*, No. 10, 1981, p. 89.

⁶⁴ This is based on personal observations by the author of this study and Soviet emigres who frequently bought second-hand goods.

⁶⁵ This excludes purchases of these goods by service sectors. A small amount of these goods is also sold for private consumption purposes. However, it is doubtful that planners can account for this type of personal consumption.

⁶⁶ Sverdlik, p. 71.

⁶⁷ Gosplan (1974), p. 481.

⁶⁸ Gallik, et al., p. 26.

⁶⁹ Quoted in CIA (1975), p. 23.

⁷⁰ Quoted in Gallik, et al., p. 4.

⁷¹ Rutgaizer, p. 168.

⁷² In the official statistics private consumption includes all consumption by the armed forces.

⁷³ Gallik, et al., pp. 18 - 19.

⁷⁴ Soviet planners, who never discuss activities of the wholesale trade network, have developed the information gap in this area of Soviet national accounts to conceal consumption by the armed forces.

⁷⁵ See Gosplan (1974), pp. 616 - 619.

⁷⁶ For the discussion of why national income excludes additions to weapon stocks see Sections 2 and 11.

⁷⁷ Some economists confuse replacement and liquidation values of capital and as a result overestimate the NFI. For the discussion of the difference between these two values refer to the above section on capital depreciation.

⁷⁸ J. Gillula, *Components of Gross Investment in 1966 and 1972 Input-Output Tables* (Washington, D.C.: Data Resources, Inc. 1984), p. 15.

⁷⁹ Rutgaizer, p. 142.

⁸⁰ See Table 3B3.

⁸¹ T. Kuznetsova, "Resursnoe Obespechenie Lichnogo Podsobnogo Khozyaistva," *Voprosy Ekonomiki*, No. 11, 1982, p. 101.

⁸² Rutgaizer, p. 124, and Table 10A.

⁸³ Ibid, p. 127.

⁸⁴ Garbuzov (1984), p. 38.

⁸⁵ Senchagov, p. 22. Also see the NKh table on these deductions; this table was discontinued in 1979.

⁸⁶ Gosplan, (1974) pp. 753 and 762.

⁸⁷ It is quite likely that this residual equals the value of components used in weapons production.

⁸⁸ For an excellent discussion of inventories refer to *Vestnik Statistiki*, No. 12, 1979, pp. 16 - 20.

⁸⁹ For the discussion of reserves refer to Freidmunt and Eydel'man, p. 93.

⁹⁰ P. Gusev, *Zakonomernosti Razvitiya Kolkhozno-Kooperativnoi Sobstvennosti v Usloviyakh Zrelogo Sotsializma*, (Moscow: Nauka, 1982), p. 33. Also see V. Tikhonov, ed., *Agrarnye Problemy Sotsializma*, (Moscow: Nauka, 1980), p. 313.

⁹¹ Gusev, p. 47.

PART III

**DISTRIBUTION OF NATIONAL INCOME
AND FINANCIAL FLOWS**

5.0 DISTRIBUTION OF NATIONAL INCOME

Planners use two methods of estimating produced national income (PNI)--as the difference between the GSP and the replacement fund (production method), and as the sum of wages and revenues (distribution method). During the current Eleventh Five-Year Plan, the distribution method became predominant for measuring the net output. New accounting practices serve the planners' major objective of increasing labor and capital productivity by maximizing the net rather than gross output.

The distribution of national income follows initial and secondary stages. The formation of primary income received by civilian production employees and enterprises takes place during the initial stage. In turn, the transfer of primary income takes place during secondary stages. The difference between primary income and transfers equals net income available to the productive labor and enterprises for end use.

5.1 THE INITIAL DISTRIBUTION OF NATIONAL INCOME

5.1.1 Primary Income of the Productive Labor.

Basic Concepts. This income has three components: 1) regular wages of state-cooperative and collective employees engaged in the production of the GSP and national income; 2) other earnings of these employees; and 3) the net product of private producers. Wage funds include all bonuses paid from profit. Other earnings include one-time bonuses which are excluded from wage funds, business trip expenses and other payments excluded from wage funds that constitute compensations for the performed work.¹ TSU officials reveal primary income of production labor only in conjunction with the published extracts from input-output tables. In accord with Marxist economic traditions, they divide the GSP into (c) material and depreciation outlays, (v) primary income of production employees--"necessary product" and (m) total revenues of production enterprises--"surplus product".

Even though TSU officials conceal all components of primary income, these components are possible to estimate with an insignificant margin of error by combining three sets of data. This data includes: 1) the NKh data on employees, 2) average wages, 3) bonus wages, 4) private production data provided by secondary Soviet sources and 5) the published input-output data on v and m for 1966, 1972 and 1977. The estimation procedure proposed in this study is based on the observation that the ratio between other earnings and total wages changes little in the short-run. Other earnings are estimated here as the difference between v and the sum of wages and the net product of private producers first for 1966, 1972 and 1977 and then for other years by continuing the trend established during the above years.

Wage Fund. On December 25, 1972, the TSU together with the USSR State Committee on Wages and Social Questions, USSR Gosplan, USSR State Bank and VTSPS (Trade Unions) published an order N10-80 on laws governing the payment

of wages to workers and service persons. All state-cooperative organizations were required to follow this order for the rest of the 1970's. According to Section 3 of this order, the wage fund includes:²

1. All monetary payments compensating for continuous, temporary seasonal work to workers and service persons either registered or not registered as part of the staff.
2. All monetary payments compensating for time actually not spent at work, such as additional breaks in conjunction with feeding a child, minor age, performing state duties, and taking a vacation.
3. All monetary payments and their equivalent in the form of free apartments, communal services, food and other material consumption items, royalties, lecture payments, grants, etc.
4. All monetary payments to employees sent to work for other organizations. Compensations for the use of worker's tools and other implements which the worker buys from his salary are excluded from the wage fund. Also excluded from the wage fund are free education and health services provided to employees and their families.

Wages by Sector. The total wage fund is estimated for each state-cooperative sector by multiplying the average monthly wages by 12 and by the average annual number of production sector employees. The number of employees working in productive T&C sectors is estimated in Section 9. There are two methods for estimating the total wage fund of other production sectors, whose employees' average monthly salary is never reported in the NKh. The first method is based on the assumption that these sectors' average monthly salary is approximately the same as that of T&D sectors. The second method is based on the NKh data on the average monthly salary for all state-cooperative employees. The second method is quite cumbersome because it presupposes the estimation of total wage funds for all state-cooperative sectors before obtaining the residual. This author applied both methods as it was necessary to obtain wage funds of all sectors anyway.

The comparison of results obtained using the above two methods leads to a discrepancy of 0.5-0.8 billion rubles. It is clear that TSU officials follow different estimation procedures for deriving the average monthly salary for the entire state-cooperative sector and for particular sectors. There seem to be two explanations for this discrepancy.

The first, most obvious explanation, points to the desire on the part of TSU officials to use the wage statistics for ideological purposes. The problem with this explanation is that one cannot find another instance where TSU officials would be willing to sacrifice the internal consistency of the official statistics for ideological reasons. Moreover, if this was indeed their intention, then they would have created the image of rapid annual growth, which is not the case.

The second explanation, which seems more credible than the first one, points to the possibility that the average monthly salary is estimated by TSU officials for all state-cooperative employees, including those engaged in defense production and those on payroll in the USSR Defense Ministry, the KGB and other military institutions which are excluded from the official labor statistics. What supports this explanation is that TSU officials present data on the average monthly salary for the entire state-cooperative sector with and without benefits received by both civilian and defense personnel from social consumption funds, such as pensions, social security benefits, free services, etc.

The total wage fund of state-cooperative employees engaged in the production of the GSP and national income includes wage funds of the following sectors: industry, state farms, other productive agriculture (seasonal labor hired by collectives), productive T&C, construction, T&D and other production labor. The estimation of wage funds in these sectors is based on the analysis of the official labor statistics derived in Section 9. CIA analysts appear to be in error when they add wages of hired labor to those of state-cooperative employees. They also overlook the above mentioned discrepancy between the total wage fund and the sum of its components. As a result, they overestimate this fund by at least 0.9-1.2 billion rubles. This overestimation as well as their inability to determine total wages of construction employees and other earnings in all sectors of the economy seriously undermines their estimates of the total monetary income of civilian households.³

Construction Wages. According to Bass (1980), wages of construction employees published in the official statistics are much smaller than those estimated independently by Soviet planners during their compilation of the NEB.⁴ This discrepancy results from the fact that reports compiled by construction organizations differ from those compiled by contractors who finance investment. While planners rely on the latter reports in their estimation of the GSP and national income, the official statistical data on average wages appear to be collected on the basis of the former reports. Planners are thus required to perform cumbersome calculations to convert the official statistics into the NEB-type format. The published NKh data on the construction PNI and net profit combined with the input-output data are sufficient for obtaining the results of planners' calculations.

In 1972, the construction PNI equaled 34.7 billion rubles, wages of state-cooperative employees based on the NKh data were 19.0 billion rubles, and the net profit equaled 6.2 billion rubles. In order to avoid double counting of bonus wages, which are independently estimated below, the sum of wages and net profit must be reduced by 0.6 billion rubles. The independently estimated wages of collective farmers and the net product of private producers equaled 0.8 and 1.3 billion rubles respectively.

According to the input-output data provided by Volkov (1977), total revenues (including bonus wages) of the construction sector equaled 8.6 billion rubles in 1972.⁵ Determined as a residual, total income of the construction labor equaled 26.7 (34.7-8.6+0.6) billion rubles, of which 24.6 (26.7-0.8-1.3) billion rubles was earned by employees of the state-cooperative sector. Other earnings comprised 3 percent of this amount or 0.8 billion rubles, while regular wages--23.8 billion rubles. The discrepancy between the Gosplan and official estimates then amounted

to 4.8 billion rubles or to more than 20 percent. The above estimation procedure can be repeated for other years, providing the availability of data on total revenues which consist of the net profit social security and other deduction payments. In 1972, social security payments equaled 1.5 (24.6*0.061) billion rubles, while other payments equaled 0.7 (8.6-6.2-1.5) billion rubles, which amounted to 10 percent of total net revenues (the sum of net profit and other deductions). The same ratio is assumed here to remain unchanged throughout the observed period.

Collectives. The NKh regularly includes data on the total wage fund of agricultural collectives. The disaggregation of this total is based on combining the derived employment statistics and wage scales established in the state-cooperative sector. The available data on the net output and employment in fishing collectives indicates that their wage fund could not exceed 0.2-0.3 billion rubles during the observed period. Planners treat the industrial output of agricultural and fishing collectives primarily as part of the food industrial output.

Industrial Sectors. Despite the fact that NKh editions exclude information on average monthly salaries in various industrial sectors, TSU officials decided to reveal it in their monthly periodical for 1965, 1970, and 1975-1983. In addition, they revealed total wage funds of industrial sectors for 1972-1975, which seemed to be a mistaken break of their secret code.⁶ The idea behind the official secrecy in the area of wage statistics is to prevent researchers from estimating wages included in production outlays of particular industries with the required precision. The publication of data on average monthly salary after 1975 was not accidental because it coincided with the TSU policy of omitting data on employment in industrial sectors.

In an attempt to obviate the information gap for 1971, this author continued the trend in the change of relative wage scales. Data on the industrial labor estimated in section 9 leads to total wage funds for each industrial sector for the post-1975 period. Total wages of n.e.c. industries, including the non-ferrous metallurgy, are determined for all years as a residual.

Net Private Product. Private producers operate in agriculture, construction and other production sectors. Their gross output was determined in the previous chapter. Planners estimate their net output as the difference between their gross output and material outlays, including depreciation in private agriculture. The same approach is used in this chapter. Material outlays of private agricultural producers can be estimated using secondary Soviet sources.⁷ Material outlays in private construction equal the value of construction materials purchased by individuals through the retail trade network, which was also analyzed in the previous chapter. Material outlays of other production producers are quite small in size and can be ignored for the purposes of this study. The derived results for the private agricultural sector are successfully tested in Section 7 which focuses on household budgets. Unfortunately, no test can be designed for private construction activities because these activities are not published as a separate revenue component of household budgets.

Other Earnings. Between 1972 and 1977 the total primary income of production labor increased from 157.8 to 200.3 billion rubles, the total wage fund increased from 128.7 to 169.3 billion rubles and private income increased from

25.5 (23.8 + 1.3 + 0.4) to 26.4 (24.5 + 1.5 + 0.4) billion rubles. Estimated as a residual, other earnings increased from 3.6 to 4.6 billion rubles, which indicates an annual increase of 0.2 billion rubles. The same trend is continued throughout the observed period. Using secondary Soviet sources on social consumption funds, this author estimated that one-time bonuses received by all employees increased from 1.7 to 2.2 billion rubles between 1972 and 1977.⁸ Production sectors' employees received around 90 percent of these bonuses or 1.5 and 2.0 billion rubles. Compensations for business trips then increased from 2.1 to 2.6 billion rubles. According to Bass (1980), planners first estimate additional wages paid as a compensation for business trips and then multiply these wages by 1.35 to determine total compensations which also cover payments for transportation and hotels.⁹ These payments equaled 0.5 (2.1 - 2.1:1.35) and additional wages were 1.6 (2.1 - 0.5) billion rubles in 1972.

Bass (1980) observed that planners disaggregate other earnings into sectors in proportion to wage funds. As Sverdlik (1981) emphasizes, the ratio between other earnings and the wage fund is smaller for farm than for non-farm employees due to their limited business travel. It is assumed here that this ratio was no more than 2 percent for the farm labor.¹⁰ The total wage fund of the farm labor equaled 26.3 and 33.4 billion rubles in 1972 and 1977 respectively, while that of the non-farm labor was 102.8 (129.1 - 26.3) and 137.2 (170.5 - 33.3) billion rubles. The ratio between other earnings and the total wage fund of the non-farm labor equaled 3.0 percent during 1972-1977. The derived ratio is the same as that reported by Sverdlik (1981) who relied on type of the official statistics that are not available to Western researchers.

5.1.2 Revenues of Production Enterprises

Basic Concepts. Total revenues for each production sector are estimated as the difference between the PNI and primary income of production labor. In 1972, total revenues equaled 155.8 billion rubles (313.6 - 157.8), including industry--105.7 (163.6 - 57.9); agriculture--11.5 (59.6-48.1); T&C--6.7 (18.5 - 11.8); construction--9.0 (34.7 - 25.7); other sectors--24.4 (37.2 - 12.8). Other sectors include T&D--11.0 (21.0 - 10.0); other production--0.4 (3.2 - 2.8); and foreign trade--13.0 billion rubles.

Planners distinguish between total and net revenues. The latter include: 1) net profit that excludes bonus wages; 2) turnover tax less subsidies; 4) net revenues from foreign trade; and 5) other net revenues. The difference between total revenues and net revenues equals transfers to service sectors and types of value added that cannot be considered as financial revenues generated by the economy as a whole. This difference constitutes one of the most obscure aspects of Soviet planning and accounting practices. Soviet economists still continue their debates as to whether social security deductions should be treated as net revenues. It will be demonstrated here that these deductions which are part of production outlays are excluded from net revenues.¹¹

The NKH financial section includes four tables on net revenues of the state-cooperative sector: 1) total financial accumulations, including net profit, the turnover tax, and other net revenues; 2) net profit by sector; 3) net profit of industrial sectors; and 4) financial accumulations of the industrial sector. In all of

the above tables the net profit includes bonus wages which are estimated below in connection with the profit distribution. In contrast, total revenues estimated in national income accounts exclude bonus wages. In addition, the NKh financial data is not disaggregated into production and service sectors as well as excludes net revenues of collective farms. The net profit of service sectors also must be subtracted from total financial accumulations in order to compare the national income and financial statistics.

Net Profit. The following service sectors earn profit: T&C, communal and everyday, culture and arts, science, insurance and banking institutions. According to Volkov (1976), these sectors earned around 10 percent of the total net profit in the early 1970s.¹² The net profit of T&C services can be estimated as a residual after accounting for the net profit of the productive T&C. In 1972, bonus wages of the entire T&C sector equaled 0.7 billion rubles, including 0.5 billion rubles in the production sector. Except for social security deductions (0.8 billion rubles) and deductions on road construction (around 0.2-0.3 billion rubles), other revenues are quite small in the T&C sector.¹³ It thus follows that in 1972 the net profit of the productive T&C equaled 6.2 ($6.7 + 0.5 - 0.8 - 0.2$) billion rubles, while that of the non-productive T&C was 6.4 ($12.6 - 6.2$) billion rubles.

The total net profit of service sectors amounted to around 9.4 ($93.5 \cdot 0.1$) billion rubles, while that of all other service sectors was 2.9 ($9.3 - 6.4$) billion rubles in 1972. The communal economy earned 1.3 billion rubles, including 1.1 billion rubles from service and 0.2 billion rubles from industrial production activities, while unidentified sectors--other production and service sectors--2.3 billion rubles.¹⁴ Estimated as a residual, other service sectors earned 1.9 billion rubles. The net profit of other production sectors comprised 0.4 billion rubles, which is arbitrarily divided into 0.2 billion rubles for the foreign trade sector and 0.2 billion rubles for other small production sectors.¹⁵

Data on agricultural collectives can be found in such sources as Venzher (1979), Semenov (1976 and 1983), and Kononov (1985) for the period ending in 1983. Data for 1984 can be extrapolated on the basis of the trend in the distribution of collective farms' gross income into wages, social security deductions and net profit established during the early 1980s. Published data applies to the net profit earned from both agricultural and industrial activities. The net industrial profit of agricultural collectives is quite small--0.2-0.3 billion rubles. Since 1983, NKh editions have contained a table on fishing collectives, whose gross income reached only 0.7 billion rubles in 1983, of which revenues comprised 0.5 billion rubles.¹⁶ In 1972, the net profit of all collective farms equaled 6.6 ($6.3 + 0.3$) billion rubles, including 6.0 billion rubles in agriculture and 0.6 billion rubles in industry.

The NKh data on the net profit of state-cooperative sectors is drawn from their financial accounts, which are not designed to cover main as opposed to subsidiary production activities. According to Lebedev (1980), profit from subsidiary nonindustrial activities comprised around 1.45 percent of the total net profit earned by industrial enterprises, which amounts to 0.7-0.8 billion rubles per annum.¹⁷ Other Soviet authors show a very similar percentage share. Unfortunately, they fail to specify what types of nonindustrial activities earn profit for industrial enterprises. It is assumed here that most of this profit is

earned by subsidiary agricultural enterprises. This assumption is based on the description of subsidiary production activities presented in Gosplan (1974).¹⁸ In other state sectors, profit earned by subsidiary enterprises is quite small in size. Trade cooperatives engage extensively in industrial and procurement activities. As listed in Korovyakovskiy (1985), cooperatives earn 65 percent of their total profit from trade activities, 20 percent from procurement activities, and 15 percent from other (apparently industry).¹⁹

Belkin and Geronimus (1978) compare financial and NEB data for 10 industrial sectors for 1970 and 1975.²⁰ On the basis of this comparison they estimated coefficients measuring the extent to which the NEB data deviates from the available financial data with respect to the total output of industrial sectors. Coefficients remained stable for the ferrous metallurgy (around 89 percent), for the fuels industry (78.6 to 77.2 percent), for power (from 73.1 to 74.4 percent), for chemicals (112.6 to 111.9 percent), for wood-working and paper industry (128.9 to 129.5 percent), for construction materials (around 106 percent), and for light and food industry (around 100 percent). The coefficient changed significantly for the non-ferrous metallurgy (78.6 to 77.2 percent) and for the MBMW (108.9 to 106.4 percent).

The above authors observe that using these coefficients for deriving the net profit can significantly distort the estimation results. Therefore, they decided to compute separate coefficients that compare the NEB and financial data with respect to the net profit. Although they avoided revealing their coefficients for the net profit, one can make a qualified guess that the NEB and financial data diverge much less with respect to the net profit than with respect to the total output. The reason for this is that subsidiary enterprises have much smaller financial responsibilities than main enterprises. Accordingly, the difference between coefficients estimated by the above authors and 100 must be reduced.

The estimated difference is assumed to equal 5 percent for the ferrous metallurgy, 6-7 percent for fuels, 7-8 percent for power, 6 percent for chemicals, 15 percent for wood and paper, 3 percent for construction materials, 0 percent for light and food industry, 3-5 percent for the MBMW sector. It is unlikely that the margin of error exceeds 5 percent (0.1 billion) for wood-working and paper industry; 3 percent (0.2 billion) for fuels, power and chemicals; 2 percent (less than 0.1 billion) for ferrous metallurgy; and 1 percent (0.3 billion) for the MBMW sector.

The NKh regularly includes data on the net profit by most industrial sectors, except for the non-ferrous metallurgy, flour, cereals and processed feed, and so-called "other heavy industries". In the early 1970s the net profit of the non-ferrous metallurgy comprised 60 percent of the ferrous metallurgy.²¹ It is assumed here that this percentage share increased to 70 percent during the observed period due to the larger growth of the non-ferrous metallurgy compared to that of the ferrous metallurgy. In 1976, TSU officials began to treat the flour and cereals industry separately from that of the food industry. The net profit of the flour and cereals industry thus can be estimated for 1965, 1970 and 1975 as the difference between the net profit of the food industry in NKh editions before and after 1976. Since this difference remained unchanged during the above years, the extrapolation procedure entails an insignificant margin of error. The combined net profit of other heavy industries is determined as a residual.

Turnover Tax and Other Net Revenues. Data on the total turnover tax is regularly reported in the NKh. The distribution of this tax between heavy industry, light industry, food industry, trade and procurement can be found in Semenov (1983), Kassirov (1981), Sorokin (1977), and Birman (1968) for the period ending in 1980.²² The increase in the turnover tax that took place after 1980 is divided into the above sectors using the trend established during the 1970s. For the purpose of estimating total supply of particular industrial goods, it is necessary to distribute the turnover tax of the heavy industry between power, fuels, MBMW, wood and paper, construction materials and other heavy industries. Prices on some products in the ferrous metallurgy and chemical industries also contain the turnover tax but in insignificant amounts (below 0.1 billion rubles).

Data on particular heavy industries (except other heavy industries estimated as the residual) is available only for the early 1970s.²³ It can be observed that the turnover tax is included in retail prices on products of all sectors, except for power and fuels. The growth of the turnover tax then can be assumed to be the same as that of retail sales and GVOs of power and fuels sectors. The sum of the derived turnover tax for particular sectors is smaller than the total turnover tax of the heavy industry for most years of the post-1972 period, apparently because of unaccounted changes in collection rates. The detected discrepancy is distributed between sectors proportionally to the derived size of their turnover tax.

Planners divide the turnover tax into Groups "A" and "B", which stand for producer and consumer goods. The division for power and fuels sectors is based on the division of these sectors' GVOs in producer prices into "A" and "B". The turnover tax contained in prices on MBMW, wood and paper and other heavy industries is treated here as part of Group "B". The turnover tax contained in prices on construction materials is treated here as part of Group "A". The turnover tax contained in prices of producer goods of light and food industries is estimated in Section 3.

In GSP and national income accounts, planners reduce the turnover tax by the amount of agricultural subsidies. In financial accounts, agricultural subsidies reduce other net financial revenues. All information on subsidies used in the present study is drawn from Semenov (1983). He provides information on subsidies for MBMW, chemical, light and food industries, and fruits and vegetables for the period ending in 1980.²⁴ This information on fuels and processed feed is for five-year periods.²⁵ Subsidies for fuels were implemented in 1978-1982, while subsidies for processed feed decreased to 0.1 billion rubles in 1976.²⁶ All his tables on subsidies exclude surcharges and added taxes that planners add to the turnover tax of food and MBMW industries. An attempt is made here to estimate surcharges and added taxes as a residual in the following way. The net turnover tax equals the difference between the turnover tax and net subsidies. The latter in turn equal the difference between total subsidies and surcharges (added taxes). The net turnover tax equals the difference between the industrial GVO in industry and enterprise prices. Consequently, in the above equation the sum of surcharges and added taxes are the only unknown variables. This sum can be disaggregated after accounting for GVOs in industry and enterprise prices for heavy industries on the one hand and light and food industries on the other.

Soviet authors never even make an attempt to obtain estimates of other net revenues which are hidden in NKh tables on financial accumulations of the entire economy and the industrial sector. Moreover, few Soviet authors have observed the fact that the amount of other official revenues listed in the NKh table on total financial accumulations is deceptively small because it represents the difference between two large amounts--foreign trade revenues and net subsidies. The explosive growth of official other revenues during the late 1970s and early 1980s indicates that the growth of foreign trade revenues overstrips that of net subsidies.

The obtained information on net subsidies and other net revenues of the industrial sector (from the NKh table on financial accumulations in industry) is still insufficient, however, for estimating revenues from foreign trade as a residual. The reason for this is the lack of data on other net revenues of other production sectors which constitute part of their value added. The derived sum of foreign trade and other revenues thus can be disaggregated only after finding an independent way of estimating foreign trade revenues. According to Galanov (1983), foreign trade revenues treated as part of financial accumulations equals the difference between imports and exports, both estimated in domestic rubles.²⁷ This difference is obtained below from published national income accounts. Due to the lack of data, other net revenues of other production sectors will be analyzed here together with other revenues of these sectors. What can be established already at this point of the analysis is that other net revenues of industrial and other production sectors are too small to contain social security deductions.

Social Security Revenues. Even though all Soviet organizations make social security deductions, financial accumulations only include deductions made by profit-seeking sectors. According to Kovalkin (1977), deduction rates are estimated with respect to the total wage fund that excludes other earnings.²⁸ Deduction rates are standard for each economic sector. Data on these rates has been published for the period ending in 1981.²⁹ These rates were as follows: total industry--7.4; coal--9.0; fuels--8.4; metallurgy--7.9; MBMW--7.7; railroads--7.5; aviation and defense--7.3; light and food--6.8; sea and air transportation--6.7; power and electronics--6.6; construction and construction materials--6.1; health, education, culture, science and state administration--5.5; communication, automotive transportation and road administration--5.3; wood and paper, communal and everyday services--4.7; trade--4.5; state agriculture and procurement--4.4; and collective farms--2.4. The latter make additional payments to the social welfare fund in the amount of 5 percent of their gross income. Data on collective farms in value terms for the period ending in 1980 can be obtained from Semenov (1983).³⁰ The average rate for the entire T&C sector is assumed here to be around 6 percent, and for other production sectors--around 4.5 percent.

In 1972, social security deductions of productive state-cooperative sectors amounted to 7.4 billion rubles, including industry--4.2 billion rubles, state agriculture--0.6 billion rubles, productive T&C--0.9 billion rubles, construction--1.2 billion rubles, T&D--0.4 billion rubles, and other production sectors--0.1 billion rubles. Collectives' social security and welfare payments amounted to 1.5 billion rubles. The total for production sectors was 8.9 billion rubles, and for agriculture was 2.1 billion rubles.

In 1982, planners introduced new rates designed to reduce significant deficits of the social security budget. If planners had not introduced new rates, then revenues of the social security system would have equaled around 15.9 billion rubles in 1982. The introduction of new rates allowed additional revenues in the amount of 6.4 billion rubles (the total was 22.3 billion rubles). It follows, therefore, that the average rate was raised by 1.4 (22.3:15.8). Using the NKh data on the structure of industrial outlays, this author determined that industrial rates were raised by only 1.3. In 1982, the industrial wage fund comprised 40 percent of the total wage fund. It is thus possible to estimate that rates were raised by 1.5 in non-industrial sectors. A more precise approach can be proposed only after TSU officials would allow the publication of data on new rates for each sector of the economy.

Other Revenues. These revenues are estimated as the difference between total revenues and the sum of net revenues and social security and welfare deductions reduced by the amount of bonus wages. These revenues can be estimated in the following way for 1972:

$$6.7 \text{ billion rubles} = [155.8 - (150.1 + 6.6 - 9.4 - 7.0) - 8.8],$$

where 155.8--surplus product, 150.1--total financial accumulations of state-cooperative sectors, 6.6--the net profit of collectives, 9.4--the net profit of service sectors, 7.0--bonus wages of production employees, and 8.8--social security and welfare deductions of production enterprises. The same procedure can be repeated for particular sectors:

$$\begin{aligned} \text{Industry-- } 5.3 &= 105.7 - (100.0 + 0.6 - 4.4) - 4.2 \\ \text{Agriculture-- } -0.5 &= 10.3 - (3.5 + 6.0 - 0.8) - 2.1 \\ \text{T\&C -- } 0.2 &= 6.7 - (6.2 - 0.5) - 0.8 \\ \text{Construction -- } 1.7 &= 8.6 - (6.3 - 0.9) - 1.5 \\ \text{T\&D -- } 1.2 &= 11.0 - (9.9 - 0.5) - 0.4 \\ \text{Other-- } 0.1 &= 0.4 - 0.2 - 0.1 \\ \text{Foreign Trade -- } 0.0 &= 13.0 - (14.3 - 1.3) \end{aligned}$$

Other revenues in industry consist of transfers to service sectors, various penalty payments and misappropriated funds which cannot be disaggregated due to the lack of data. Other revenues in agriculture equal transfers to service sectors plus the balance of state insurance payments and premiums minus production subsidies to state farms. The latter began to make state insurance payments only in 1980. The ratio between these payments and total production outlays of collectives gradually decreased during the 1970s from 4.7 to 4.0 percent.³¹ In 1972 the ratio equaled 4.7 percent, while production outlays were 37.5 (43.2-5.7) billion rubles. Payments then equaled 1.8 billion rubles. Premiums exceeded payments in 1972 by 150 percent. The balance of state insurance payments and premiums amounted to -0.9 billion rubles for collective farms. In 1972, transfers from agricultural to service sectors equaled 0.4 billion rubles. Transfers are insignificant in size in T&C, T&D and other production sectors. The inordinately high size of other revenues in the T&D sector is puzzling and hence requires a separate inquiry.³²

Foreign Trade Revenues. As noted in sections 3 and 8, of this study, planners include wages and revenues of foreign trade organizations together with those of domestic trade organizations.³³ The foreign trade sector is represented in the GSP and national income statistics only with net revenues from foreign trade, which as planners emphasize, are earned by the entire economy.³⁴ These net revenues consist of two parts: the balance between imports and exports in domestic rubles and surplus foreign trade revenues also converted into domestic rubles. While the above balance is treated as part of national income available for end use and as financial accumulations, the above surplus revenues cannot be used for domestic purposes.

Planners include these surplus revenues in the PNI to register additional financial resources generated by means of foreign trade activities. When these revenues are negative, i.e., when imports exceed exports in gold rubles as in 1972, these revenues are entered in national income accounts with a minus sign. These revenues are estimated in domestic rubles using the export or import conversion coefficient which are derived in Section 8. As these revenues were negative in 1972, planners used the import conversion coefficient. The total foreign trade revenues are first estimated as a residual after accounting for the PNI of T&D and other production sectors. After that, the balance of imports and exports can be determined by subtracting surplus revenues from total foreign trade revenues.

Planned Production Losses. This author initially made a conceptual error by assuming that planned production losses are included in the agricultural and construction PNI similarly to the way surplus foreign trade revenues are included in the PNI of the foreign trade sector.³⁵ In reality, planners register planned losses during the distribution rather than production stage of national income. In effect, these losses constitute the depletion of reserves accumulated over the years. During the distribution stage these losses reduce the amount of goods available for end use, including stockpiled reserves and unfinished construction projects. As a result, the value of agricultural and construction output exceeds the value of these sectors' goods available for end use. For this reason, planned losses cannot be found on accounts of agricultural and construction enterprises during the production stage of national income. In this study, total planned losses are determined as the difference between the PNI and national income for end use increased by the amount of net additions to foreign currency revenues. Planned agricultural losses are in turn determined as the difference between total and construction losses.

5.2 DISTRIBUTION OF REVENUES

5.2.1 The Official Statistics and Income Distribution

According to the Soviet economic theory and planning practices, primary income of production employees and enterprises constitutes the original source of all revenues in the economy. One of the major purposes behind planners' compiling of national income accounts is to trace the distribution of primary income to service and defense sectors. The distribution of primary income thus constitutes one of the best guarded secrets of the Soviet state. Soviet authors were never allowed to publish annual statistics even indirectly relating to the income

distribution and consumption patterns of production employees.³⁶ This fact must be quite frustrating to all Soviet economists because the analysis of production employees' disposable income relative to that of other sectors is the pillar of the Marxist economic theory. The extraordinary secrecy surrounding this income is extended by Soviet officials to the disposable income of production enterprises. The reasons for all this secrecy are clear: Soviet officials want to conceal the amount of resources available to civilian and defense sectors for end use.

The lack of data on income distribution makes it impossible to study the budgets of production employees separately from those of other employees. The study of the entire household budget, is sufficient, however, for deriving data on production employees' consumption patterns--the task which is reserved for Section 7. Similarly, the detailed study of transfers from production enterprises to service sectors, budgetary and credit organizations is reserved for Section 6. The present discussion instead focuses on the type of income distribution that receives some coverage in the Soviet literature--profit distribution, including the formation of wage and capital bonus funds, as well as financing and structure of capital investment.

By focusing on profit distribution, TSU officials divert the attention of economists from a peculiar fact that all other net revenues without exception are extracted to the state budget. A large part of net revenues received in addition to the net profit can be seen as the indirect taxation of households. In addition, the state budget collects all social security and welfare deductions, 60 percent of the entire profit earned by enterprises, all surplus foreign currency earnings, and some deductions that are treated as part of material outlays (on forestry development and geological works). Considering the fact that total profit exceeds net profit by around 8 percent, budgetary payments comprise 64 percent of the net profit.

One thus estimates that in 1972 the state budget collected 82 percent of total revenues received by production enterprises or 128 out of 156 billion rubles. In absolute terms, the state budget received more than 128 billion rubles because national income is reduced by the amount of budgetary subsidies in the areas of agriculture and foreign trade. As estimated in the next chapter, all such subsidies amounted to 24 billion rubles in 1972. Total budgetary revenues extracted from the net income of production enterprises then equaled as much as 152 billion rubles in 1972.

5.2.2 Profit Distribution

The NKh includes two tables on the distribution of profit earned by those enterprises that did not suffer losses. The first table covers the entire state-cooperative sector, while the second table covers this sector's industrial enterprises. Both tables are presented in percentage terms without decimal points. Data in value terms is available only for the late 1960s.³⁷ One item listed in the first table can be obtained in value terms--total profit collected as a state budgetary revenue, which is reported for the entire economy in the NKh table on the state budget. Using the second table is complicated by the absence of data on the total industrial profit allocated to the state budget. Officials of the USSR Finance Ministry who publish budgetary statistics every five years list combined payments of industrial and construction sectors. While they provide separate listings for

other sectors, including agriculture, T&C, housing-communal services, and trade, they fail to identify residual sectors. Similar to all other financial statistics, budgetary statistics must be restructured to identify production and service T&C and residual sectors.

The disaggregation of budgetary data on the combined payments of industrial and construction sectors can be based on the comparison of net profits earned by these sectors. Budgetary payments of the T&C sector can be disaggregated in proportion to the net profit earned from production and service activities. In 1972, budgetary payments of residual sectors equaled 4.2 billion rubles. Residual sectors include supply and procurement agencies, other production sectors, as well as other service sectors. All of these production sectors earned the net profit in the amount of 5.0 billion rubles, of which 60 percent or 3.0 billion rubles was paid to the state budget. It follows, therefore, that the net profit of other service sectors extracted to the state budget equaled 1.2 billion rubles.

The NKh tables on profit distribution include the following entries: budgetary payments from the balance profit, budgetary payments from the net profit (including various categories of payments), capital investment and formation of livestock, wage and capital bonus funds, additions of inventories and financing losses of subsidiary non-production services, payments to the state bank, financing losses of other production enterprises, and the formation of financial reserves. Payments from the balance profit apparently include various penalty payments that are treated as other net revenues in other NKh tables.

Profit remaining at the disposal of enterprises is usually insufficient for financing an adequate capital accumulation program. Enterprises are thus forced to resort to the support of banking and budgetary institutions which exercise an extensive leverage in the reallocation of centralized financial resources. Having this leverage enables Soviet planners to allocate any extra resources from profitable to non-profitable enterprises.³⁸

The NKh includes data on short- and long-term credits issued to major economic sectors. While short-term credits serve the purpose of financing working capital and losses, long-term credits are used primarily for capital investment purposes. Since short-term credits are issued several times during one production year, the NKh data on these credits is inapplicable for the study of national income distribution.³⁹ Instead, one must analyze appropriate NKh tables for determining sources of financing working capital.

The derived data on profit distribution can be used for deriving information on resources remaining at the disposal of enterprises. Additions to inventories can be estimated using the NKh table on sources of financing inventories. Losses suffered by production enterprises equal the difference between the total profit and the net profit listed in the NKh table on financial accumulations. Total credit payments are estimated here using the detailed NKh data on long-term credit by sector. These payments equal the difference between total issued long-term credits and the amount of unpaid long-term credits remaining in the end of each year. Additions to financial reserves are thus estimated as a residual. Further disaggregation of derived results into particular non-industrial sectors is complicated by the absence of data on losses suffered by

these sectors and their subsidiary services.⁴⁰ For the purposes of this study, however, the detailed analysis of financial reserves formed by each sector is not essential because the objective is to determine total resources available to all production enterprises for end use.

Both the NKh tables on profit distribution and on collective farms exclude data on the distribution of their gross income. Data provided by Semenov (1983) on the distribution of collectives' gross and net income for the years 1965, 1970 and 1975-1980 is hence very useful for filling the data gap. Semenov provided two tables. In the first table, he divided the gross income into wages, social security and welfare deductions, and net income. In the second table, he divided net income into income taxes, formation of fixed capital and inventories, social consumption funds, reserve funds and other, which primarily consist of credit payments.⁴¹ Even though data is presented in percentage terms, it is easy to convert this data into value terms by applying the regularly reported NKh data on collectives' gross income. What appears as a more difficult task is the extrapolation of his data for the 1971-1974 period with the desired precision. Data on income taxes can be found in Semenov (1977).⁴² Other components of net income can be estimated only approximately by assuming the following proportions between these components--62:16:4:8. The margin of error is around 3-5 percent or 0.2-0.4 billion rubles.

5.2.3 Wage and Capital Bonus Funds

Basic Concepts. Before the 1967 reforms, bonus funds had a limited function of encouraging the efficient use of resources and technological innovation. The introduction of new bonus funds in the aftermath of reforms manifested a radical departure from the traditional reliance of the state authority on socialist slogans and administrative measures to promote the increase of labor and capital productivity. Soviet leaders apparently recognized that even under socialism, individual concerns still remained the major incentive for good performance. They thus became convinced of the need to provide extra incentives to employees, especially to the managerial personnel, for improving the attainment of planning quotas leading to higher profit earnings. The latter were supposed not only to increase personal income and improve capital productivity but also to guarantee an additional financial support for expanding budgetary programs, especially in the defense area.

By 1970, new bonus funds comprised 85 percent of all bonus funds formed by enterprises and became a major means of increasing incentives outside bonuses included in workers' basic wages that are treated as part of production outlays. By 1976, capital bonus funds replaced allocations from profit as a major means of financing net capital investment by enterprises.

The NKh includes four tables on bonus funds containing data on total bonus funds of state-cooperative sectors, on the structure of bonus funds formed by all these sectors, by industrial and construction enterprises. New bonus funds include material incentive funds, socio-cultural and housing funds that finance both current expenditures and capital investment, and funds for developing production. One part of new funds is formed with monetary resources allocated from the net profit, while the other formed from depreciation deductions. An

insignificant part of material incentive funds that is registered with production outlays will be ignored in this study. Any margin of error that results from this approach is canceled out by treating all personal income received from other bonus funds as being registered as part of production outlays.

Other bonus wages that existed before reforms include bonuses for winning a competition, for a successful technological breakthrough, and for utilizing scrap materials. The latter are also used for financing capital investment. The size of these bonus funds changed little during the past two decades. Other capital bonus funds include funds for developing local industry and agricultural production. Special purpose funds are registered as part of production outlays and are used for non-production purposes, including payments to education and science organizations, for preparing cadres, administering kindergartens, and research services. A certain portion of these funds is financed by parents as payments for kindergarten services. Soviet authors indicate that special purpose funds are also allocated for financing additional rewards for technological innovation, though their size appears to be quite small (below 0.1 billion rubles).⁴³

In NEB accounts bonus funds are divided into bonus wages, transfers to non-production sectors, and capital bonus funds, all of which in turn are divided into sources of financing. TSU officials much complicate the task by concealing the size of wage and capital bonus funds by publishing data on new funds only for the industrial sector. While the NKh table on profit allocation include all allocated bonus funds, the NKh table on bonus funds includes only actually spent bonus funds. This fact can be established by comparing NKh editions before and after 1970. While most unused funds serve as an additional source for forming financial reserves, some unused funds are extracted to the state budget. The size of these unused funds can be determined after estimating the part of new wage and capital bonus funds allocated from profit.

Estimation Procedure. Ratios between new bonus wages and total wage funds were recently revealed for industry, construction, agriculture, transportation (including its various sectors), and trade for 1975, 1980 and 1982 in the journal Voprosy Ekonomiki.⁴⁴ Ratios were around 8 percent for industry, increased from 2.4 to 3.0 and to 3.3 for construction, fluctuated around 4 percent for state agriculture, dropped from 6 to 5 percent in transportation, and increased from 10 to 11 percent in trade. The ratio between new bonus wages and profit, however, remained on the same level in transportation--7 percent. The trend established during the above three years can be extrapolated for other years of the observed period with an insignificant margin of error due to the fact that the NKh data is available every year for the industrial sector, whose new bonus wages comprise around 70 percent of the total. The ratios can be assumed to be the same in the entire T&D sector. New bonus wages in communication and other production sectors are apparently quite small--0.2 and 0.1 billion rubles respectively.

In an attempt to reduce the margin of error it is also useful to incorporate data on total new bonus wages listed by Milyukov (1977) for the period ending in 1974.⁴⁵ According to Milyukov, the total for new bonus wages equaled 6.9, 8.1, and 9.0 billion rubles, while the total for socio-cultural and housing fund equaled 2.1, 2.3, 2.5, 2.9, and 3.1 billion rubles in 1970-1974 respectively. Determined as a residual, the total fund for developing production equaled 3.3, 4.1, 4.7, 3.9, and 4.1

billion rubles. As reported in the NKh, the corresponding industrial bonus funds equaled 3.7, 4.1, 4.4, 4.8 and 5.2 billion rubles; 1.6, 1.7, 1.8, 1.7, and 1.7 billion rubles; and 3.3, 3.7, 4.1, 3.9, and 3.9 billion rubles. Determined as residuals, non-industrial state bonus funds equaled 2.0, 2.2, 2.5, 3.3, and 3.8 billion rubles; 0.5, 0.6, 0.7, 1.2, and 1.4 billion rubles; and 0.0, 0.4, 0.6, 0.0, and 0.2 billion rubles.

Ratios between industrial and non-industrial bonus funds established in 1973-1974 can be extrapolated for the rest of the 1970s with an insignificant margin of error due to the relatively small size of all socio-cultural and capital bonus funds of the non-industrial sectors. These funds are then disaggregated into sectors proportionally to the total amounts of these sectors' bonus funds. It will be assumed here that, like in industry, more than 80 percent of non-industrial capital bonus funds are registered as part of the net profit. The above derived data on profit distribution makes it possible to estimate bonus funds allocated from the industrial profit. These funds are smaller than total new funds of the industrial sector by the amount of capital bonus funds formed with resources allocated from depreciation deductions. A separate procedure, however, must be developed for disaggregating the total for new industrial bonus funds into particular sectors. This procedure is necessary for deriving wage funds of particular industrial sectors treated as production outlays.

As Soviet economists observe, engineering and managerial personnel (ITR) began to receive bonus wages from profits in July of 1967, concurrently with the launching of economic reforms. The introduction of new bonus wages can also be traced to that year. Soviet authors hint indirectly to the fact that workers gained much less from the new source of income than the ITR. In 1970, industrial workers received only 47 percent of new bonus wages, even though they comprised 85 percent of the entire industrial labor force.⁴⁶ This fact can be used to obtain data on new bonus wages received by the ITR in each industrial sector proportionally to their wage funds. Data on the ITR employed in industrial sectors can be found in *Vestnik Statistiki*.⁴⁷ MBMW and chemical sectors thus form proportionally larger new bonus funds than other industrial sectors because they hire proportionally more ITR. The margin of error for each of 10 industrial sectors can hardly exceed 0.2 billion rubles because the total for new industrial bonus wages reached only 7 billion rubles in the beginning of the 1980s.

5.2.4 Financing of Capital Investment

This section is concerned with sources of financing as well as the technological structure of capital investment. As was discussed in previous chapters, capital investment excludes additions to livestock and budgetary commissions of M&E. The purpose of analyzing sources of financing is to determine total budgetary outlays on capital investment as a residual after accounting for all other sources of financing. The purpose of analyzing the structure of capital investment is to convert the NKh data from constant to current prices and to estimate investment into M&E for each economic sector.

Sources of Financing. The NKh includes data on state-cooperative, collective and private financing of capital investment. Housing cooperative construction is partly financed by individuals.⁴⁸ Even though NKh editions began to include data on this construction only for 1975, 1980 and 1983, Soviet authors

provide information on this construction for other years as well.⁴⁹ The objective, therefore, is to establish sources of financing capital investment in the state sector on the one hand and in the collective sector on the other. While totals for these two types of investment are listed in the official statistics in constant rubles, Soviet authors provide data on sources of financing in current prices or in percentage terms. Data presented in percentage terms was originally derived from tables also estimated in current prices. The initial estimation step hence must entail the conversion of the NKh data from constant to current prices using construction and MBMW price indexes derived in Section 3.

It is difficult to compare data quoted by Soviet authors with that listed in the NKh data for two other reasons as well. First, most of this data was forecast by planners before the collection of actual production reports received by planners in the end of the year. Second, this data includes budgetary financing of unfinished production and other working assets in construction organizations that are excluded from capital investment reported in the NKh. Nevertheless, data provided by Soviet authors still proves useful for learning about secondary sources of financing capital investment.⁶⁰

During the 1970s sources of financing state investment changed in the following way: state budget from 50 to 40 percent, long-term credits from 3 to 8 percent, profit from 17 to 7 percent, depreciation deductions from 21 to 26 percent, and others from 10 to 19 percent. Other sources are divided into new capital and other bonus funds (5 to 14 percent), and saved capital investment funds (5 percent), including savings from decreasing prices on M&E from 2.5 to 1.2 billion rubles, mobilization of unused resources in construction from 1.6 to 2.3 billion rubles, and other unidentified funds from 0.2 to 1.7 billion rubles.

Even though data on all sources of financing state capital investment is available for only several years of the 1970s, the independently derived data on most non-budgetary sources can be subtracted from the total capital investment to determine budgetary outlays on capital investment for all years of the observed period. The only uncertainty surrounds annual fluctuations of small capital investment funds. The margin of error for budgetary outlays derived as a residual is apparently insignificant because the ratio of these savings and total investment remained the same during the observed period.

The procedure for disaggregating total budgetary outlays on capital investment into various state sectors also can be based on the residual method. Total investment by sector is estimated below, depreciation deductions in Section 4, and allocations from profit (without livestock) and capital bonus funds were already estimated above. The total for mobilization of resources by construction enterprises and saved M&E funds can be disaggregated proportionally to investment into buildings and equipment of each sector. Data on long-term credits by sector is regularly reported in the NKh. For the purposes of this study, the derived data on capital investment financed with budgetary resources is most useful with respect to industrial and transportation sectors because investment into these sectors serves both civilian and military purposes and because other budgetary outlays on civilian industry are insignificant in size.

As reported in Semenov (1983), sources of financing capital investment in collective farms changed between 1970, 1975 and 1980 in the following way : depreciation deduction increased from 27 to 33 to 40 percent, net income and other decreased from 45 to 33 to 13 percent, and credit payments increased from 28 to 35 to 48 percent.⁵¹ In his article published in 1977, Semenov divided sources of capital investment in collective farms into different components, which in 1975 were as follows: depreciation deductions--25, net income--23, state insurance premiums--0.2, revenues from liquidated capital--2, credits--32, and other--18 percent.⁵² He thus disaggregated other sources into depreciation--5, net income and other--10, and credits--3 percent. In his 1983 book, he also provided a separate table on the formation of fixed capital, including livestock, and working capital with funds drawn from net income. Data listed in this table combined with the NKh data on livestock in collectives is sufficient for estimating financing of capital investment from net income for the post-1975 period. Other sources are thus determined as a residual.⁵³

Structure of Capital Investment. The most detailed description of the technological structure of capital investment can be found in two editions of the Gosplan manual and in the CEMA publications.⁵⁴ According to these sources, capital investment consists of: 1) construction-assembly works; 2) machines, equipment and instruments (M&E); 3) construction design works; 4) oil and gas exploration works; 5) gardening; 6) land reclamation and melioration; and 7) purchases of linen for hotels 8) other capital works and expenditures. The latter include outlays on supporting managerial and technical personnel and training of the work force for enterprises under construction, special additional payments and bonuses that are excluded from price lists on construction-assembly works, science outlays made by enterprises under construction (except those made in connection with testing and installation of new equipment), outlays on resettlement and purchases of installations from the cooperative-collective enterprises. Planners set limits which enterprises cannot exceed in allocating their funds for each of the above categories of capital investment. The existing data makes it possible to estimate all of the above categories of capital investment for major economic sectors, except for those categories listed as other expenditures which can be cumulatively estimated as a residual.

The NKh includes data on total construction-assembly works, M&E, construction-design works, and other. Data on gardening can be found in the NKh table on agricultural investment, data on geological exploration works--in the NKh table devoted to these works (including those financed from the state budget), and data on land reclamation can be estimated using the NKh table on the structure of fixed capital in the public agricultural sector. This table lists all types of fixed capital, except for outlays on land reclamation, which can be obtained as a residual from the NKh table on the structure of agricultural fixed capital. Other capital investment cannot be disaggregated due to the lack of data. Except for investment into gardening and purchases of linen (0.2-0.3 billion rubles), all other capital investment is registered as expenses incurred in connection with construction works.

The NKh also includes data on capital investment of state-cooperative and collective enterprises and individuals as well as on the technological structure of the productive investment of the state-cooperative sector in percentage terms. The

CEMA publications include data on totals for production and non-production sectors, while the NKh table on investment into agriculture includes data on productive investment in collective farms. Since the NKh data on the structure of productive investment presented in percentage terms excludes decimal points, the derived data in value terms is approximate. It can be compared with the approximate data derived below as the sum of investment into particular production sectors. The average of the two independently estimated results is accepted as the final estimate. The derived results fluctuated on the average around 0.4 billion rubles or around 0.2 percent for most years of the observed period. The significant discrepancy detected for the year 1978 requires further investigation which must determine whether it can be explained by the unavailability of data on the planners' updated report for that year.

The CEMA publications include data on the technological structure of capital investment into industry, agriculture, and T&C. It can be assumed that the structure of investment into other production sectors corresponds to the structure of these sectors' fixed assets reported in the NKh for 1973. The margin of error is apparently small due to the predominant place of M&E (70 percent) in the construction sector's fixed capital and the predominant place of buildings and installations (80 percent) in the structure of fixed capital employed in T&D and other production sectors. The technological structure of capital investment into all non-production sectors thus can be found as a residual.

The analysis of capital investment into non-production sectors is complicated by the fact that official statistical publications group communal, everyday, health and administration sectors on the one hand and education, culture, arts and science sectors on the other. In fact, the housing sector is the only service sector which receives a separate coverage. According to Rutgaizer (1975), investment into communal and everyday services steadily comprises 20 percent of investment into housing.⁵⁵ Budgetary statistics can be used to obtain data on around 80 percent of the total investment into the health, education, culture and arts sectors. The additional data on total capital investment into these sectors can be obtained by comparing NKh tables on socio-cultural expenditures and social consumption funds, both of which are analyzed in detail in the next chapter. Investment into science and administration sectors hence can be derived as residuals for all years of the observed period.

As listed in the NKh for 1972, M&E comprised 1.5 percent of the entire capital stock of housing, communal and everyday services run by profit seeking enterprises; and 22 percent of other service sectors' capital stock, which excludes commissions of M&E.⁵⁶ It thus can be assumed that M&E comprises no more than 20 percent of the entire investment into these service sectors. Estimated as a residual, investment into M&E of the administration sector doubled from 1 to 3 billion rubles between 1970 and 1984.

This is a startling discovery because most of investment into the state administration sector consist of investment into buildings and installations. One

thus must conclude that TSU officials conceal investment into defense production sectors together with that into service sectors. If one assumes that the structure of investment into defense production sectors is the same as that into the MBMW sector, then the total defense investment increased from 1.8 to 4 billion rubles between 1970 and 1984.

END NOTES

¹ Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), p. 611. Other monetary wages include advance payments made to workers during recruitment drives. L. Bass, "Razrabotka Pokazateley Chistory Produktssii v Otchotnom Mezhotraslevom Balanse," *Vestnik Statistiki*, No. 3, 1980, p. 52, also mentioned stipends paid by enterprises. Since the size of these stipends is quite small, no attempt is made here to avoid double counting these stipends in estimating total monetary income of households.

² I. Kovalkin, *Spravochnik Po Uchotu Truda i Zarobotnoi Platy*, (Moscow: Finansy, 1977), p. 12.

³ U.S. Central Intelligence Agency, *U.S.S.R.: Gross National Product Accounts, 1970, Research Aid, A (ER) 75-76*, November 1975, pp. 23 - 25, and U.S. Congress, Joint Economic Committee, *U.S.S.R.: Measures of Economic Growth and Development, 1950-80*, 97th Congress, 2nd Session, 1982, pp. 128 - 129.

⁴ Bass, p. 55. Further research into the subject must determine whether labor of defense construction organizations is excluded from the official labor force together with the defense industrial labor. The underestimation of construction wages. Another possibility is that planners add the value of embezzled construction materials to regular wages in their compilation of the GSP and national income balances. In this case, the output of private producers would be much larger than that estimated as the sum of private investment and repair.

⁵ A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov*, (Moscow: Finansy, 1976), p. 126.

⁶ *Vestnik Statistiki*, No. 8, 1973 and No. 9, 1976, pp. 88 - 89.

⁷ See Section 3, footnote 25. The ratio between material outlays and the GVO of private agricultural producers increased from 20 to 30 percent during the 1970s.

⁸ V. Garbuzov, et al., *Problemy Razvitiya Sotsialisticheskikh Finansov*, (Moscow: Finansy, 1977), p. 161.

⁹ Bass, p. 52.

¹⁰ Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*, (Novosibirsk: Nauka, 1981), p. 66, who assumed that the ratio is 1 percent, overlooking the fact bonuses comprise a substantial part of other earnings.

¹¹ A. Birman, *Ocherki Teorii Sovetskikh Finansov*, 1st and 2nd Editions, (Moscow: Finansy, 1968 and 1972), pp. 56 - 57, argued correctly against the dominant view of Soviet economists that financial accumulations include social security deductions. It somehow eluded his attention that planners adhere to this view.

¹² Volkov, p. 48.

¹³ V. Galanov, *Svodnyi Finansovyi Balans*, (Moscow: Finansy, 1983).

¹⁴ Profit earned by enterprises serving electric power to households is estimated as 5 percent of the total profit earned by the power sector. This percentage ratio is in turn derived on the basis of data on power usage collected by D. Gallik, *Consumption in the 1972 Soviet Input-Output Table*, A Working Paper, (Washington, D.C.: U.S. Department of Commerce, Bureau of the Census, 1983), pp. 23 and 26.

¹⁵ Sverdlik, pp. 92 - 93, also assumed that profit of other production sectors equaled 0.2 billion rubles. This assumption can be justified by analyzing the structure of net product of the forestry sector whose profit approximately equals 0.1 billion rubles. The fact that profit of foreign trade agencies is hidden together with that of other sectors can be ascertained using two pieces of evidence. First, as listed in NKh notes on profit of trade organizations, the latter excludes foreign trade agencies. Second, as listed in Gosplan (1974), p. 609, the GVO of foreign trade agencies is added to that of domestic trade organizations.

¹⁶ This conclusion is based on the analysis of labor statistics presented in Section 9.

¹⁷ B. Lebedev, et. al., *Ekonomicheskii Analiz Deyatel'nosti Promyshlennykh Predpriyatiy i Ob'yedineniy*, (Moscow: Mysl', 1980), p. 234.

¹⁸ Gosplan (1974), pp. 701 - 702.

¹⁹ D. Korovyakovskiy, "Potrebitel'skaya Kooperatsiya", *Voprosy Ekonomiki*, No. 10, 1985, p. 70.

²⁰ V. Belkin, and A. Geronimus eds., *Model' Dokhod-Tovary i Balans Narodnogo Khozyaistva*, (Moscow: Nauka, 1978), p. 119.

²¹ N. Sycheva, ed., *Finansy Predpriyatiy i Otrasley Narodnogo Khozyaistva*, (Moscow: Finansy, 1973), p. 134.

²² See Table T5B2 in Volume II of this study.

²³ See Joint Economic Committee (1982), p. 160.

²⁴ V. Semenov, *Finansovo-Kreditnyi Mekhanizm v Razvitii Sel'skogo Khozyaistva*, (Moscow: Finansy i Statistika, 1983), p. 178, provided data for 1982, and V. Galanov, *Svodnyi Finansovyi Balans*, (Moscow: Finansy, 1983), p. 82, provided data for 1983. The extrapolation procedure for other years is based on continuing the trend.

²⁵ The disaggregation procedure implemented here is based on the assumption that these subsidies grew each year.

²⁶ Semenov, p. 177.

²⁷ Galanov, pp. 93 - 94.

²⁸ Kovalkin, p. 64.

²⁹ T. Konyukhova, ed., *Sbornik po Finansovomu Zakonodatel'stvu*, (Moscow: Yuridicheskaya Literatura, 1980), p. 517.

³⁰ Semenov, p. 57.

³¹ Ibid, p. 109.

³² NKh editions used to include a table on the structure of outlays in the trade and dining sectors (see 1974 edition, pp. 648 - 649). Credit payments and administrative expenses of higher echelons comprise a significant part of total outlays and thus may explain the noted puzzle. Other revenues also include the movie tax (0.2 - 0.3 billion rubles).

³³ See Belkin and Geronimus, p. 213, for the discussion of this aspect of Soviet national accounts.

³⁴ Gosplan (1974), p. 610.

³⁵ Belkin and Geronimus, pp. 208 - 209.

³⁶ NKh editions include a table on the end use of national income in constant prices for the period of three to five years. This table contains a row for consumption by production employees and their families. The analysis of household budgets presented in Section 7 demonstrates that TSU officials conceal consumption by defense industrial employees together with civilian production employees.

³⁷ See *Vestnik Statistiki*, No. 4, 1968, pp. 83 - 85.

³⁸ Some Soviet financial analysts correctly observe that this practice contributes to lagging productivity trends as it discourages enterprises from earning extra profits. See, for example, Garbuzov, pp. 68 - 69.

³⁹ Refer to N. Barkovskiy, *Problemy Kredita i Denezhnogo Oborota v Usloviyakh Razvitiya Sotsializma*, (Moscow: Finansy, 1976), pp. 33 - 34, for a discussion of this issue.

⁴⁰ In fact, Soviet authors never even mention losses suffered by enterprises outside industrial and agricultural sectors.

⁴¹ Semenov, pp. 57, 59.

⁴² See Semenov's article in Garbuzov, (1977), p. 266.

⁴³ N. Parashutin and Ye. Kozlova, *Kurs Bukhalterskogo Ucheta*, (Moscow: Finansy, 1977), p. 384.

⁴⁴ Zh. Sidorova, "Stimuliruyushchaya Rol' Fonda Material'nogo Pooshchreniya," *Voprosy Ekonomiki*, No. 10, 1984, p. 33. Also refer to *Fond Material'nogo Pooshchreniya v Otrasyakh Narodnogo Khozyaistva*, (Moscow: Finansy i Statistika, 1985).

⁴⁵ A. Milyukov, "Obrazovanie i Ispol'zovanie Fondov Pooshchreniya Na Predpriyatiyakh i v Ob'yedineniyakh," *Oplata Truda Pri Sotsializme*, (Moscow: Ekonomika, 1977), p. 107.

⁴⁶ P. Kuchkin and N. Moroz, *Chisty Dokhod Sotsialisticheskogo Obshchestva*, (Moscow: Finansy, 1974), p. 91.

⁴⁷ See *Vestnik Statistiki* No. 11, 1983, p. 45 and *Vestnik Statistiki* No. 10, p. 95

⁴⁸ Household financing is estimated as the difference between total financing and new housing credits.

⁴⁹ See Sverdlik, p. 96.

⁵⁰ For example, refer to N. Zelenkova, *Finansirovanie i Kreditovanie Kapital'nykh Vlozheniy*, (Moscow: Finansy, 1979), p. 54.

⁵¹ Semenov, p. 64.

⁵² Garbuzov, p.263.

⁵³ See Semenov, p. 63, for the discussion of these sources of financing for capital investment.

⁵⁴ Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1980), pp. 393 - 397, and the CEMA Statistical Handbook for 1984, p. 424.

⁵⁵ V. Rutgaizer *Resursy Razvitiya Neproizvodstvennoi Sphery*, (Moscow: Mysl', 1977), p. 155.

⁵⁶ NKh 1972, p. 66.

6.0 SERVICES, BUDGETARY AND CREDIT SECTORS

This section continues the discussion of the distribution of national income. While the previous section focused on transfers from production sectors, the objective of the present section is to analyze financial flows of sectors-recipients of these transfers, i.e., services, budgetary and credit sectors. All non-Marxist and some Soviet economists recognize that service sectors generate value added.¹ Soviet planners, however, continue to adhere to their traditional belief that services participate in transferring income rather than in contributing to the production of new value for the society.

At the early stages of the Soviet economic development, planners' approach could have been justified by a simple observation that the development of the productive base took priority over developing services. The unwillingness of Soviet planners to change their methodology at the present time can be explained by their realization that increasing national income by the amount of value added of service sectors would seriously weaken the TSU secret code. Indeed, the disclosure of the total volume of services and sources of their financing would make it much easier to estimate the amount of resources available to civilian sectors for end use. It would also simplify the estimation of the total household outlays, which conspicuously exceed outlays of civilian households.

6.1 HOUSEHOLD, SCIENTIFIC AND ADMINISTRATIVE SERVICES

6.1.1 Classification of Sectors

Planners classify service sectors according to the type of provided services, sources of financing and recipients of services.² The Gosplan manual lists the following types of services: 1) non-productive T&C; 2) housing, communal and non-productive everyday services; 3) education, culture and arts; 4) health, social services and sports; 5) state insurance and banking organizations; 6) science and scientific services; and 7) state administration, including volunteer associations and various political and trade unions. Production organizations finance 2 (housing), 3 (preparation of cadres), 4 (health and sports facilities), 5, 6 and 7. Households finance 1-5 and 7. The state budget finances all of the above services.³

The classification of sectors-recipients is based on two theoretical tenets peculiar to the Marxist thought. First, profit-seeking services, kindergartens, health and sports facilities financed by households are for private consumption. Second, services financed by the public sector for households are treated as social benefits provided by the state. The exceptions are budgetary T&C, communal-everyday, culture (TV, radio stations and press), and administration. In addition, planners distinguish between current and capital (investment and repair) outlays on sectors providing social benefits. Social consumption funds include the sum of current outlays (without social security deductions) but exclude capital outlays of household services.⁴ While TSU officials much advertise the volume of household and scientific services provided by the state budget and production organizations, they reveal almost no information on the volume of profit-seeking services, budgetary T&C, housing and communal services, and the total volume of

administrative services. This selective coverage predetermines the analysis of service sectors, which is divided here into non-profit household services and science, profit-seeking services, and budgetary T&C and administrative sectors.

6.1.2 Education, Culture and Arts Health, Social Services and Science

Data Base. State financing of services is covered in the following NKh tables: 1) Social consumption funds; 2) Outlays on socio-cultural measures and science; 3) State budgetary outlays on service sectors; and 4) State social security budget. The additional data on services can be found in the budgetary statistics published by the USSR Finance Ministry, in Vestnik Statistiki (VS) which includes tables on public and household financing of the education sector, and in the informative work by Rutgaizer (1975) who provides material (excluding depreciation) outlays for each service sector for the period ending in 1973.

NKh table 2 (as referenced in the previous paragraph) includes data on both current and capital outlays of the public sector and has the following entries in billions of current rubles (data for 1975): total (97.6), education (26.2), culture and arts (4.8), science (17.4), health and sports (14.6), social security and welfare (34.6), including pensions (24.4). The VS table for 1975 divides public outlays on education (26.7) into current outlays (22.4) and capital outlays (4.3) as well as includes an entry for total household outlays on education (1.0).⁵ Total for education in the VS tables exceeds that in the NKh table by 0.5-0.6 billion rubles, which can be explained by varying approaches on the part of TSU officials to what constitutes education as opposed to propaganda work.

Total for education in the VS table exceeds that in the above NKh table by 0.5-0.6 billion rubles, which stands for social security deductions which are used as one of the sources of financing pensions and allowances. TSU officials correctly avoid double counting of public outlays on pensions and allowances by reducing total public outlays on education, culture, health and science by the amount of social security deductions in both NKh tables (1) and (2).⁶ Soviet authors largely fail to account for this TSU practice and thus appear unable to compile a reliable data base for the study of the above service activities.

NKh table 3 includes the following entries in billions of current rubles (data for 1975): total (77.0); education and science (32.8), education and science without capital investment (31.0), including general education (13.9), culture (1.0), preparation of cadres (7.0), press, arts, TV and radio (1.1), and science (7.9); health and sports (11.5), health and sports without capital investment (10.8), state social welfare (18.2), including state social welfare budget (14.3) state social security (11.8), maternity allowances (0.4) and collectives' funds (2.4). The total for social security and welfare allocated from the state budget then amounted to 32.8 billion rubles. Budgetary outlays on capital investment exclude commissioned M&E, which can be estimated using All-Republic budgets -0.8 billion rubles for education and culture and 0.3 billion rubles for health in 1975. Total budgetary investment into these sectors then equaled 2.5 and 1.0 billion rubles respectively. Budgetary outlays on education and health exclude recreational facilities for children and sanatoriums which are financed from the state social welfare budget. Total budgetary outlays on education and health equaled 21.2 and 11.6 billion rubles respectively in 1975.

NKh table 4 contains disaggregated data on the total for state social security and welfare budget (26.2), including pensions (17.8), allowances (7.2), sanatoriums (0.8), recreational facilities for children (0.3) and current expenditures of this sector (0.2). Publications of the USSR Ministry of Finances provide additional information on capital investment into science (0.1) and total outlays on arts (0.1). Most investment into science is treated as part of investment into production sectors. Data on arts makes it possible to estimate outlays on TV, radio and press (1.0=1.1-0.1) which are excluded from social consumption funds.

NKh table 1 includes the following entries in billions of current rubles (data for 1975): total (90.1); education and culture (25.1), including stipends (2.2) and recreational facilities for children; health, including sanatoriums, and sports (12.9), social security and welfare (34.6), including pensions (24.4) and allowances (9.2); and 4) housing subsidies (4.9), which equal the difference between total outlays of the public housing sector (excluding net investment) and rent payments. Vacation payments (10.6) and one-time bonuses (2.0) are hidden in the residual, which is disaggregated using secondary Soviet sources.⁷ The residual for social security and welfare (1.0=34.6-24.4-9.2) stands for this sector's current outlays.

Estimation Procedure. The comparison of NKh tables 1 and 2 leads to the sum of capital investment and repair of non-profit household services: education--4.3 = 26.2 - 21.9, culture and arts--1.6 = 4.8 - 3.2, health and sports--1.7 = 14.6 - 12.9. The social security and welfare sector has insignificant capital outlays - below 0.1 billion rubles. Capital repair of these sectors was estimated in Section 4: education--1.0 billion rubles, culture and arts--0.2 billion rubles, and health--0.4 billion rubles. Determined as a residual, capital investment into these sectors equaled: education--3.3 = 4.3 - 1.0, culture and arts--1.4 = 1.6 - 0.2, health--1.3 = 1.7 - 0.4.

The total volume of household services equals the sum of current and capital outlays reduced by the amount of net investment. The latter is determined as the difference between the sum of capital investment and commissioned M&E on the one hand and the value of liquidated capital (estimated in Section 4) on the other. Total current outlays are estimated as the sum of public and household outlays. Data on household payments for education can be found in the V.S., and for health and culture and arts in Rutgaizer (1975) and Mayer (1977)⁸ According to these Soviet authors, household payments comprise 6 percent of total outlays on health, and 25 percent of total outlays on culture and arts. The comparison of tables 2 and 3 leads to data on financing of current outlays by production sectors as opposed to the state budget: education - 2.0 = (21.9 + 0.5) - 20.4, culture and arts - 2.3 = 3.4 - (1.0 + 0.1), and health - 3.3 = 14.6 - 11.3. When planners estimate the total volume of services they reduce total current outlays by the amount of stipends, pensions and allowances, which are entered in planners' accounts as items on the list of household monetary revenues. At the same time, the total volume of services is increased by the amount of the net profit earned by culture, tourist and other organizations providing services to household for profit.⁹

The division of total outlays on science into current and capital outlays is much more difficult to implement because, in contrast to the above household services, TSU officials exclude science from the NKh table on social consumption

funds. The procedure proposed here is based on independent estimates of capital outlays in the science sector as the sum of capital investment and repair outlays. The NKh table on capital investment by sector has an entry for education, culture and arts, and science. The above estimates of capital investment into education, culture and arts first must be reduced by commissioned M&E and then converted to constant prices. After that, capital investment into science in constant prices can be determined as a residual from the NKh table on capital investment. The conversion from constant to current prices is based on derived construction and MBMW price indexes using the assumption that the structure of capital investment into science is the same as that into the MBMW sector.¹⁰ Capital repair outlays into science are estimated in Section 4.

Current outlays thus can be determined as the difference between total outlays (including social security deductions) and capital outlays. Financing of the science sector's current outlays by production enterprises equals the difference of total current outlays and budgetary financing of science. The latter consists of three parts: direct outlays on science, financing of geological works, and operational expenditures, all of which are discussed below. The ratio between financing by production enterprises and total financing of current expenditures in the science sector is also used to divide capital outlays in science into sources of financing.

The above estimation of services provided by education, culture and arts, health and social services, and science is based primarily on the data base published in the official statistics and thus can be repeated for any year with an insignificant margin of error. Data on wages and deduction rates are also available for each year. Material outlays thus can be determined as a residual for each of these sectors.

6.1.3 T&C, Housing, Communal, Administration and Other Services

Due to the inadequate coverage of these sectors in the official statistics, it is impossible to estimate the total volume of these services without relying on secondary Soviet sources. More specifically, the official statistics provide no coverage of current, capital and material outlays in these services. In addition, the researcher must make cumbersome calculations to obtain wages and the net profit of T&C services--the task which was performed in the previous section. Other difficulties concern sources of financing T&C services. Soviet authors never even mention the fact that some current expenditures of T&C sectors are financed from the state budget. The apparent reason for this secrecy is that a large part of such budgetary activities is outside the civilian economy. The absence of the unified data base on these services for most years of the observed period thus necessitates the development of a specific approach to analyzing each of these services.

T&C Services. The estimation of wages, social security deductions and the net profit of these sectors is based entirely on labor statistics which are complete enough for deriving the number of productive T&C employees. Knowledge of this number first leads to all value added indicators of the productive T&C which then can be subtracted from the officially reported totals for the entire T&C sector to obtain data on wages, social security deductions and profit for non-productive T&C services. Households and the state budget are the two major sources of

financing T&C services. Deductions for road construction and maintenance made by production enterprises constitute the third source of financing. These deductions, however, are insignificant in size--around 0.3 billion rubles, of which around 0.2 billion rubles are allocated for current maintenance.¹¹ One can thus assume that most of the derived profit and depreciation deductions of T&C services are financed with revenues received from serving households.

The CEMA labor statistics are useful for deriving the number of employees in budget-supported T&C services. This in turn leads to their wages and social security deductions. The estimation of depreciation in these services is based here on the published data on capital stock, which is analyzed in Sections 4 and 10. The official statistics thus appear complete enough for estimating the entire volume of T&C services financed by households and the state budget, except for material outlays.

According to Rutgaizer (1975), the total volume of T&C services offered to households comprised 9.9 and 1.5 percent of the total services in 1965, 9.4 and 1.6 percent in 1970, 9.3 and 1.6 percent in 1973.¹² The share of everyday services equaled 3.9, 5.4 and 6.1 percent, while their volume in value terms--1.9, 4.1 and 5.7 billion rubles.¹³ Total services then amounted to 48.7, 75.0 and 93.4 billion rubles; and T&C services financed by households--5.6 (4.9+0.7), 8.2 (7.1+1.1), and 10.3 (8.7+1.6) billion rubles. During these years, the net profit of T&C services equaled 3.1, 6.0 and 6.9 billion rubles, while depreciation deductions equaled 0.9, 1.3 and 1.6 billion rubles.

Determined as a residual, the sum of material and labor outlays equaled 0.9, 1.1 and 1.5 billion rubles. This residual, however, is not large enough to cover material outlays alone. According to Rutgaizer, the ratio between material outlays and the total volume of transportation and communication services increased from 23.9 and 37.3 percent in 1965, to 25.5 and 37.1 percent in 1970 and to 27.7 and 36.4 percent in 1973.¹⁴ Material outlays thus equaled 1.4 (1.1+0.3), 2.2 (1.8+0.4) and 2.8 (2.3+0.5) billion rubles. The entire labor outlays of T&C services equaled 3.5 (3.2+0.3), 5.0 (4.5+0.5) and 6.4 (5.8+0.6) billion rubles. Of these outlays, the household sector financed 3.2, 4.6 and 5.8 billion rubles.¹⁵

Total household financing of outlays in T&C services then equaled 5.5 (0.9 + 1.4 + 3.2), 8.1 (1.3 + 2.2 + 4.6) and 10.2 (1.6 + 2.8 + 5.8) billion rubles.¹⁶ The same amounts are listed by Soviet authors for all household T&C services. It is apparent that the net profit of T&C services eluded the attention of Soviet authors. Such an obvious estimation error points to the possibility that eminent Soviet specialists on household budgets failed to make their independent estimates and instead misinterpreted data given to them by planners. Sverdlik (1981) also noted the problem with the underestimation of total household outlays on T&C services but provided no explanation as to its causes.¹⁷

The easiest way to extrapolate data on material outlays of T&C sectors for the post-1973 period is to follow the Soviet planners' method which is based on continuing the trend in the ratio between labor and material outlays established in productive and non-productive T&C sectors.¹⁸ The data base prepared in this study, including data on labor outlays of productive and nonproductive T&C

sectors as well as data on material outlays of productive T&C sectors, makes it possible to perform the extrapolation of data with the required precision.

Housing Communal & Everyday Services. The total volume of these services is estimated using two methods: as the sum of material, depreciation and labor outlays and profit; and as the sum of household and public outlays on each of these services. The absence of data on material outlays and communal services complicates respectively the use of the first and second methods. In this light it is necessary to combine the two methods. The first method is limited to the period ending in 1975 for which data is obtained as a residual after accounting for material outlays of all other household services. In turn, the second method is effective for the post-1975 period. The trend in the ratio between outlays and profit of the communal economy established before 1976 can be continued after 1975 with an insignificant margin of error.

Total material and depreciation outlays of household services increased from 11.2 billion rubles in 1965 to 16.6 billion rubles in 1970 and to 24.1 billion rubles in 1975.¹⁹ Using the estimation procedure outlined above, this author estimated that in education these outlays equaled 3.6, 5.3 and 7.5 billion rubles; in culture and arts, 0.6, 1.1 and 1.8 billion rubles; in health, 2.6, 4.2 and 5.8 billion rubles; and T&C, 2.3, 3.5 and 5.3 billion rubles. Determined as a residual, material and depreciation outlays of housing, communal and everyday services equaled 1.7, 2.6 and 3.7 billion rubles. These services' labor outlays equaled 2.2, 3.8 and 5.4 billion rubles, while net profit without bonuses equaled 0.8, 1.0 and 1.2 billion rubles. The total volume of these services then equaled 4.9, 7.4 and 10.3 billion rubles.

Housing services are determined as the sum of household payments on rent and housing subsidies. According to Soviet sources, rent payments increased during the 1970s from 1 ruble 46 kopecks to 1 ruble 58 kopecks per square meter of useful living space, whose total amount is regularly reported in the NKh.²⁰ CIA analysts believe that the NKh data on living space must be reduced to account for the unoccupied housing space.²¹ Contrary to this belief, it is assumed here that TSU officials already account for most unoccupied living space in their estimates. Possible omissions made by TSU officials are counterbalanced by extra rent payments collected from occupants of luxurious new apartments. Consequently, the above rent rates may indeed correspond to the average rates used by planners for the estimation of household expenditures on public housing, which equaled 1.1 billion rubles in 1965, 1.6 billion rubles in 1970 and 2.0 billion rubles in 1975. Housing subsidies equaled 2.3, 3.4 and 4.9 billion rubles during these years. Total housing services then amounted to 3.4, 5.0 and 6.9 billion rubles.

According to Soviet sources, total household payments for rent (including hotels) and utilities (including gas and power) increased from 3.0 to 4.6 billion rubles between 1965 and 1970.²² Payments for rent and heating comprised 69.5 and 67.3 percent of the above amounts or 2.1 and 3.1 billion rubles, including payment for hotel and heating serviced by communal sectors - 1.0 (2.1 - 1.1) and 1.5 (3.1 - 1.6) billion rubles.²³ Profit comprised 50 percent of these amounts. Applying the same profit rate leads to the amount of communal services for 1975 - 2.0 billion rubles.

TSU officials usually report data on everyday services in constant prices without making any distinction between productive and nonproductive services. According to the Gosplan manual, nonproductive everyday services include rentals, mortuaries, agencies for apartment cleaning, barber shops, public baths, etc. The NKh table includes data on public baths, barber shops and rentals. It can be determined that 80 percent of the residual contained in the NKh table pertains to other nonproductive services.²⁴ Data on everyday services in current prices can be found in Vestnik Statistiki for the period ending in 1972. The comparison of this and the NKh data reveals a close proximity of current and constant prices for that period. The comparison of NKh editions published before and after 1976 indicates a significant deflation of prices for the entire volume of everyday services. However, price changes had little effect on the volume of nonproductive everyday services. The difference between this volume in current and constant prices reached only 0.2 billion rubles by early 1982.

The volume of nonproductive communal services increased from 0.5 billion rubles in 1965 to 0.8 billion rubles in 1970 and to 1.4 billion rubles in 1975. The total volume of housing, communal and everyday services then amounted to 4.9, 7.4 and 10.3 billion rubles--the same amounts estimated above following a different method. One is thus justified to extrapolate data for the communal economy for the post-1975 period. Material outlays for that period are estimated as a residual.

Administration and Other Services. The Soviet concept of state administration extends far beyond the state apparatus to all public and paramilitary organizations. In national income accounts the administration sector also includes budget-supported T&C services. Other service sectors include state insurance and banking agencies. Since material and depreciation outlays of other sectors are quite small, the volume of their services can be simply defined as the sum of labor outlays and net profit, which is disproportionately large. State insurance agencies do not earn profit from serving state and collective farms. It thus follows that all profits of insurance agencies are collected from serving households. The difference between insurance payments and premiums accounts for 90 percent of all insurance services.²⁵

There are three sources of financing the state administration: the state budget, membership dues made by members of public organizations, and deduction payments made by production enterprises. The total volume of administration services can be estimated as the sum of material, depreciation and labor outlays for the period ending in 1975. Material and depreciation outlays can be estimated as a residual after accounting for these outlays in the science sector, while labor and wage statistics are published regularly in the NKh.²⁶ TSU officials do not even hide the fact that these statistics exclude employees of the USSR military administration working in the Defense Ministry, KGB and the Ministry of Internal Affairs.²⁷

As suggested in section 4, depreciation of defense production capital is hidden together with that of the state administration sector. The analysis of the available national income data on this sector confirms the above suggestion. In 1970, the total volume of administration services, including road administration, equaled 5.5 billion rubles, including material outlays--0.8, depreciation outlays--1.5, and labor--3.2. Such high depreciation outlays much exceed capital repair and

retired capital in the administration sector, which according to this author's estimates equaled only 0.5 billion rubles ($0.3 + 0.2$) in 1970.²⁸ Depreciation of the defense production capital accounts for the remaining 1.0 billion rubles. In effect, the volume of administration services equaled 4.5 rather than 5.5 billion rubles. Of this amount, material and depreciation outlays of the central military administration are assumed to comprise at least 0.3 billion rubles.

Budgetary financing of administration services covers not only current but also capital outlays. In addition, budgetary data applies exclusively to the civilian administration. Outlays on the military administration are aggregated into the defense budget. In 1970, budgetary financing of the state administration amounted to 1.7 billion rubles. Of this amount, net investment comprised 0.2 billion rubles, while the actual volume of administrative services comprised 1.5 billion rubles.²⁹ Transfers from households and production enterprises then accounted for 75 percent of the total volume of administrative services or 3.0 ($4.5 - 1.5$) billion rubles.

CIA analysts estimate total membership dues (2.1 billion rubles) as the sum of trade union dues (1.4), Communist Party dues (0.4) and other (0.3).³⁰ The estimation is based on the assumption that trade union dues constitute 1 percent of wages earned by 94 million members and that party dues constitute 2 percent of wages earned by 14.2 million party members. Transfers from production sectors then accounted for 0.9 billion rubles. This amount excludes net investment into roads and administrative buildings.

The derivation of data on material and depreciation outlays for the post-1975 period can be based on continuing the trend in the ratio between budgetary and total financing of the administrative sector established before 1976. Using this approach, it is possible first to estimate the total volume of administrative services and then material and depreciation outlays as a residual. The estimation error depends on the extent to which budgetary financing declines by more than 1 percent during a particular year. Due to the stability of established sources of financing administration activities, it is difficult to expect that the margin of error could exceed 5 percent by the early 1980s.

6.2 BUDGETARY AND CREDIT FLOWS

As was evident from the above discussion of financial flows, budgetary and credit organizations participate in transferring a significant share of financial resources generated by profit-seeking sectors. While the above discussion centered on particular aspects of budgetary and credit flows (payments from profit, financing of capital investment and services), the following discussion focuses on unifying these flows for the purpose of uncovering a number of secrets hidden in the available budgetary and credit statistics. These secrets include total revenues from foreign trade, revenues received from defense organizations, the existence of budgetary deficits, financing of defense sectors, foreign trade and other subsidies, transactions between budgetary and credit organizations and the formation of state reserves. In order to uncover these secrets it is necessary to follow planners' classification of numerous components comprising budgetary and credit flows. The

discussion is divided into three parts dealing with budgetary revenues, budgetary outlays and the balance of credit payments.

6.2.1 Budgetary Revenues

Official vs. Planning Classification. Budgetary statistics are published in the NKh and in the publication of the Ministry of Finances which will be referred to here as the MF. Both of these publications are based on the same classification principles, which in many respects differ from those followed by planners in integrating the NEB with budgetary statistics.³¹ The authors of the NKh and MF present budgetary revenues as follows (in billions of current rubles for 1980): 1) the total (302.7); 2) public sector (276.8); 3) the turnover tax (94.1); 4) payments from profit (89.8), including those made by industry and construction, agriculture, transportation, communication, housing and communal services, trade and state insurance; 5) payments from profit divided into types of payment; 6) income taxes paid by collectives (0.8) on the one hand and cooperative and public organizations (0.9) on the other; 7) state social security revenues (15.7); 8) forestry tax (0.5); 9) unspent funds remaining from the last year (3.3); 10) revenues received from the public sector (71.7), including those received by All-Republic (6.3) and All-Union budgets (65.4); 11) total revenues received from households (25.9); 12) income taxes (23.0); 13) local taxes (1.0), including agricultural, real estate and land taxes, custom duty, taxes on vehicles, etc; and 14) revenues from selling bonds (0.6) and lotteries (0.3).

The above revenues are allocated between All-Union and All-Republic budgets. The latter also receives revenues reallocated from the All-Union budget. In 1980, total revenues equaled 302.7 billion rubles, including 169.7 for the All-Union budget and 133.0 for the All-Republic budget. The reallocated funds amounted to 0.6 billion rubles. In addition, planners transfer revenues between budgets to cover additional financial needs of budget-supported organizations. In 1980, transfers to and from the All-Republic budget amounted to 10.5 and 2.9 billion rubles respectively. Altogether, the All-Republic budget received additional revenues in the amount of 8.2 (10.5-2.9+0.6) billion rubles, while its total revenues reached 144.1 billion rubles, and that of the All-Union budget was 161.5 billion rubles.

As opposed to the above official classification of budgetary revenues, planners divide revenues received from public and household sectors into production, non-production and defense sectors. In addition, they specify payments from profit made by each economic sector (see previous section) and disaggregate other revenues into deductions on geological works and the use of water resources, special purpose funds (social security and welfare deductions of collective farms, payments made by households for the use of education and health facilities and other), net revenues, unused funds extracted from enterprises, and the emission of additional money. Other net revenues include revenues received from transactions with the outside world (import and export revenues, revenues from monetary gold operations and tourism, etc), saved administrative expenditures, movie tax, and a number of other net revenues listed in the previous section in connection with the NKh table on financial accumulations.

The way planners classify revenues of the state social security budget remains a puzzle. Various NKh and MF tables include four different revenues of this budget, which will be analyzed here for 1980. For example, the NKh tables on budgetary revenues and outlays contain 14.2 and 15.9 billion rubles, while the MF tables on revenues of the entire state and All-Republic budgets contain 14.0 and 15.7 billion rubles respectively. The number 15.9 also appears in the MF table on All-Republic budgetary outlays. The total outlays of the state social security budget equaled 35.3 billion rubles, which were financed with revenues and subsidies in the amount of 15.9 and 19.4 billion rubles respectively.

This author would like to propose the following explanation for the above discrepancies: total revenues of the state social security budget (a) consists of payments made by those organizations whose labor force is included in the official statistics (b), by military organizations whose labor force is excluded from the official statistics (c), other small revenues collected as penalty payments (d), and household outlays on sanatoriums (e). As estimated by this author in the previous section, (b) equaled 14.0 billion rubles in 1980, including 11.1 billion rubles paid by production sectors and 2.9 billion rubles paid by service sectors. According to Sychev (1979), (e) comprises less than 1 percent of (a) or 0.2 billion rubles.³² It thus appears that the NKh and MF are compiled differently with respect to (e). If one believes such Soviet sources as Darkov and Maksimov (1975) and Maslov (1979), then the MF classification is the one accepted by planners.³³ As these sources emphasize, when planners compile reports on budgetary revenues they exclude (e) from (a). Special purpose funds apparently constitute the budgetary entry that contains (e). Both profit-seeking and budgetary organizations form special purpose funds in the form of bonus funds. Manuals on industrial enterprises in fact note that these funds contain payments by parents for the use of kindergartens.

Although (d) has never been reported in Soviet literature, its size is relatively small--around 0.2-0.3 billion rubles. Trade unions collect (d) as penalty payments resulting from the violation of labor code on the part of enterprises. Channels of collecting (d) are similar to those used to collect other penalty payments and thus should not be confused with regular social security payments. At the same time, one also cannot exclude the possibility that it is (d) rather than (e) that causes the divergence between the NKh and MF editions. Whatever the case, social security deductions of defense organizations (c) can be determined as a residual after subtracting (b), (d) and (e) from (a). In 1980, (c) equaled around 1.4 billion rubles ($15.9 - 14.0 - 0.2 - 0.3$) or 8 percent of social security deductions made by those enterprises whose labor force is included in the official statistics.

Other Revenues. Other budgetary revenues constitute one of the least explored areas of the official statistics. For the purposes of this study, it is necessary to divide other revenues received by the All-Union and All-Republic budgets. What this author could gather from the available literature is that the All-Union budget includes all revenues resulting from foreign transactions (f), social security and welfare payments of collective farms (g), agricultural surcharges (h), saved administrative expenses of those organizations that receive their financing from the the All-Union budget (i), and the emission of additional money (j). With the exception of (j), all of the above revenues can be estimated with an insignificant margin of error.

As demonstrated in Section 8, total revenues from foreign trade equal the sum of the foreign trade PNI, and import and export subsidies. The foreign trade PNI was determined in the previous section, while the estimation of import and export subsidies is discussed below in the section on budgetary outlays. In 1980, total revenues from foreign trade equaled 55.1 (44.8+10.3) billion rubles. Non-commodity foreign transactions amounted to around 1.0 billion rubles, including 0.8 billion rubles received from sales of gold. The estimation of these revenues is based on Western literature which is also discussed in Section 8.

The estimation of (g) is based on data reported in Semenov (1983), while (h) is determined as the difference between total and net subsidies in section 3.³⁴ In 1980, (g) and (h) equaled 1.7 and 3.0 billion rubles respectively. According to Garbuzov (1977), the entire administrative savings amounted to 4.4 billion rubles during 1971-1975 and 2.0 billion rubles during 1976-1977.³⁵ This means that the state budget receives annual revenues from these savings in the amount of 1.0 billion rubles, including 0.6 billion rubles for (i). The emission of additional money then equaled 4.0 (65.4-55.1-1.0-1.7-3.0-0.6) billion rubles. The same procedure can be repeated for all other years of the pre-1981 period. Before the upcoming publication of the MF edition for the 1981-1985 period it is possible to estimate foreign trade subsidies only approximately using trends established during the 1970s.

Other revenues received by All-Republic budgets have a number of components, most of which are difficult even to identify. For the purposes of this study, it is necessary to distinguish between other net revenues, payments made from factor cost and unused funds. Unfortunately, the existing data base is insufficient to perform even this division with the required precision, thus undermining the analysis of financial flows in the Soviet economy. Using the NKH table on financial accumulations, one can estimate that other net revenues, excluding agricultural surcharges, amounted to 5.3 billion rubles, which is smaller than other revenues of the All-Republic budget by 1.0 billion rubles. This amount equals the difference between the sum of payments made from factor cost and unused funds on the one hand and production subsidies that reduce total revenues of enterprises on the other. According to Yevdokimov (1974), production subsidies comprise 0.8 percent of total budgetary outlays on profit-seeking enterprises which are difficult to estimate with any precision.³⁶ If one assumes that these outlays are equivalent to outlays on national economy, then production subsidies equaled 0.6 billion rubles in 1980. The noted sum thus equaled 1.6 (1.0+0.6) billion rubles. Further research must establish the margin of error resulting from the proposed estimation procedure.

6.2.2 Budgetary Outlays

Official vs Planning Classification. Similar to budgetary revenues, budgetary outlays are classified differently in official publications and planning tables. The MF authors divide outlays into five groups of sectors and into seventeen types of outlays. Four groups include 1) financing national economy (fne), including financing of the same sectors as those reported in the table on revenues; 2) socio-cultural measures, including education, science, health, sports,

social welfare, and social security; 3) civilian administration; 4) defense budget; and 5) "other measures."

The following types of outlays are specified only for the All-Republic budget: 1) wages; 2) office expenditures; 3) business trips; 4) technical education and purchases of books by libraries; 5) stipends; 6) outlays on food; 7) commissioned M&E; 8) planned capital investment of budgetary organizations; 9) capital investment of profit-seeking enterprises; 10) additional investment of budgetary organizations; 11) additional (unplanned) investment of profit-seeking enterprises; 12) office equipment and uniforms; 13) capital repair of buildings and installations; 14) planned additions of working assets; 15) financing of insufficient working assets; 16) pensions and allowances; 17) other types of outlays.

Although the complete planning classification has never been revealed in the openly published literature, it is possible to make a qualified guess by focusing on the task of consolidating data on budgetary flows with data on the production of goods and services. The planning classification must have the fine and socio-cultural sections divided into civilian and defense production as well as into civilian and defense services for each sector of the economy. This concerns not only sections listed, but also those sectors which are either classified as part of large groups of sectors or hidden in the fine and total budgetary residual.

Financing of the industrial-construction group covers supply and distribution sectors, geological works, operational expenditures and investment into science. Financing of the agricultural sector also covers operational expenditures and financing of the procurement sector. Investment into urban electricity-based transportation is included together with communal services. Some outlays on education and health services are financed from the social security budget.

In addition, the planning classification must specify the contents of the fine residual and "other measures" as well as divide outlays on each sector into current and capital outlays, working assets, subsidies and reserves. As evident from extracts of the planning classification listed by Soviet authors, current outlays are divided into more than 50 categories.³⁷ Given the fact that most of these categories cannot even be cataloged, the estimation procedure in that area must be limited only to major components comprising current expenditures.

An attempt will be made here to estimate the following categories of budgetary outlays: current material outlays of budgetary sectors; regular wages of budgetary sectors; social security deductions; pensions, allowances, stipends and other monetary transfers from the state budget to households; capital investment of profit-seeking sectors; capital repair of profit-seeking sectors; capital investment of budgetary sectors; capital repair of budgetary sectors; commissioned M&E; formation of livestock; working assets of profit-seeking sectors; production subsidies; agricultural subsidies; foreign trade subsidies; housing subsidies; expenditures connected with the preservation of temporarily terminated construction projects; and material reserves. Budgetary financing of wages in profit-seeking enterprises was practically eliminated in the 1970s and thus can be ignored for the purposes of this study.

Profit Seeking Sectors. As opposed to budgetary sectors, all profit-seeking sectors are grouped in the *fne* section of the budget. The structure of budgetary outlays on profit-seeking sectors projected by planners for a particular Five-Year Plan was revealed only once in the openly published literature by Yevdokimov (1974).³⁸ Although his data for the 1971-1975 period may actually diverge from the actual allocations of that period, it provides a unique opportunity for these researchers who want to learn about a general Soviet policy toward budgetary financing of profit-seeking sectors. According to this policy, capital investment (34%) and repair (2%), operational expenditures (9.3%), additions of working assets (3.2%) and so-called "other outlays" (agricultural and foreign trade subsidies, unfinished production in construction and material reserves) comprise around 99 percent of all budgetary financing of profit-seeking services. This fact much simplifies the estimation of all other expenditures comprising the remaining 1 percent, i.e., design works performed in connection with urban development (0.13%), production subsidies (0.8%), formation of livestock (0.1%), bonus wages (0.14%), and housing subsidies (0.08%). It thus must be accepted as given that all these small expenditures have comprised less than 1.5 percent of the total or 1.5-2.5 billion rubles throughout the observed period.

Data on the above percentage shares provided by Yevdokimov were apparently extracted from forecasting reports prepared by planners before the completion of the Eighth Five-Year Plan. These reports usually diverge from actual achievement reports compiled in the end of the planning period. In addition, the sum of all percentages provided by Yevdokimov exceeds 100 percent. The above problems limit utility of his data with respect to the estimation of total budgetary outlays on profit-seeking sectors with the required precision.

Even a superficial comparison of Yevdokimov's and budgetary data indicates, however, that the officially reported total for *fne* (467 billion rubles for 1971-1975) much exceeds total allocations to the profit-seeking sector that can be estimated as the ratio between operational expenditures and its percentage share. Operational expenditures are allocated to finance various agricultural services, geological and forestry works, and some advanced scientific research performed by industrial enterprises. According to Semenov (1983), operational expenditures in agriculture amounted to around 12.3 billion rubles in 1971-75, of which state budgetary allocations amounted to 11.0 billion rubles.³⁹ Outlays on geological and forestry works amounted to 10.4 and 3.5 billion rubles respectively.⁴⁰ The evidence provided by Soviet experts on industrial finances indicates that annual operational expenditures in this sector do not exceed 0.5-0.6 billion rubles.⁴¹ Total operational expenditures thus equaled around 27.5 billion rubles, while total financing of profit-seeking sectors equaled 295.7 (27.5:0.093) billion rubles during 1971-1975. The weapons procurement bill hidden in the *fne* then approximately equaled 171.3 (467-295.7) billion rubles for that period.

Annual defense allocations hidden in the *fne* can be derived with more precision as a residual after accounting for each category of budgetary financing of profit-seeking sectors in value terms for each year of the observed period. Data on operational expenditures and agricultural subsidies is least problematic as it is reported by Soviet authors, with the exception of geological works which NKh editions began to cover in 1981. One peculiarity about agricultural subsidies is that state budgetary outlays include gross subsidies which exceed net subsidies by

the amount of surcharges that are entered on the revenue side of the budget. Planners use the same approach with respect to foreign transactions. Unfortunately, while it is possible to estimate surcharges with the required precision, revenues received from foreign transactions remain a closely held secret. This necessitates the development of an independent approach to the estimation of foreign trade subsidies.

Official reports on the fine contain a residual, which as demonstrated by Semenov (1983) includes agricultural and foreign trade subsidies.⁴² It also includes operational expenditures in the forestry sector (0.7 billion rubles each year). Foreign trade subsidies contained in this residual hence can be determined without any margin of error. The problem arises when one wants to estimate total foreign trade subsidies. Many Western observers believe that such subsidies are only included in the entry for the trade sector. As demonstrated by Semenov, the noted residual includes import subsidies. It is assumed here that total foreign trade subsidies equal the sum of import and export subsidies, where the latter is hidden in the budgetary financing of the trade sector. Import subsidies include purchases of defense-related industrial goods from other countries.

By 1980, All-Union budgetary outlays on the trade sector reached 0, thus confirming the fact that during the 1970s planners shifted foreign trade subsidies from the budgetary category "trade" to the fine residual. This shift also coincided with the increasing gap between the value of imported capital goods in foreign and domestic currency and with the decreasing gap between exports of capital goods in domestic and foreign currency. The existence of gaps between domestic, CEMA and world price levels is, in effect, the reason why foreign trade transactions must be subsidized.

All working assets, including material reserves and unfinished production in construction, can be estimated using the NKh and VS tables on sources of financing these assets. As discussed in Sections 4 and 10, material reserves are treated as commodities stored by supply and procurement agencies. In the official statistics, budgetary financing of working assets is hidden in the category creditors. Annual additions of working assets in profit-seeking enterprises financed with state budgetary funds amount to around 2.3-2.5 billion rubles. Yevdokimov's data, however, points to around 2.0 billion rubles. The discrepancy of 0.3-0.5 billion rubles may be attributed to the fact that planners underestimated budgetary financing of working assets.

Capital investment and repair constitute by far the largest components of financial support received by profit-seeking enterprises from the state budget. The collection of data on this support must be completed for each sector of the economy using the approach discussed in the previous section in connection with sources of financing capital investment in the state-cooperative sector. This approach requires the preparation of the following data base: total investment and repair for each sector in current prices; allocations on capital investment (without livestock) from profit, capital bonus funds, depreciation funds and long-term credits and other small sources of financing. After the above data base is completed, budgetary financing of capital investment and repair can be determined for each sector as a residual.

The data base for estimating the fne defense component is thus complete for each sector of the economy. This study's results indicate that the cost of weapons production usually exceeds the derived fne defense component. It is assumed here that insufficient funds are covered by means of budgetary deficits, which reached as much as 15 billion rubles in 1983.

Budgetary-Supported Sectors. These sectors are divided into three categories: socio-cultural measures, state administration, and the defense budget. Financing of socio-cultural measures is in turn divided into education, culture, arts, TV and press, health and physical culture, social security budgets, and science. This financing covers both current and capital outlays in all of the above sectors as well as transfers to households in the form of stipends, pensions and allowances. The budgetary statistics include data on capital investment into education and culture, and health. This data is derived independently for science and administration sectors. Capital outlays on those science sectors that serve particular industries are included in the appropriate fne entries. Current outlays on these sectors are divided into material outlays, wages and social security deductions. The division is performed proportionally to the ratio between material and labor outlays established for the entire financing of these sectors. While sources of financing these sectors were discussed in the previous section, the following discussion centers on these sectors' civilian and defense activities.

Defense Science. For decades Western researchers have explored the issue of outlays on defense-related science by interpreting a couple of brief citations by Soviet academic economists whose knowledge of the extent of Soviet military research and development (R&D) programs seems quite unreliable. An alternative approach centers on analyzing sources of financing R&D by means of following Soviet national accounting principles.

In the aftermath of the 1960s reforms, science organizations serving the civilian production sector began to earn profit for their research work. By the beginning of the 1970s, most scientific services performed in the production sector were placed on the contractual basis. To ensure the uninterrupted availability of monetary resources needed to pay for R&D services, planners ordered industrial ministries to share the responsibility for administering specially created research funds. By 1982, the value of these funds reached 4.5 billion rubles.⁴³ Behind the idea to allocate these funds from gross revenues was planners' obvious objective to eliminate the dependence of ministries on their reserve funds, which are supposed to serve only emergency needs, such as unforeseen production losses.⁴⁴ However, planners' hidden objective was to limit the size of reserve funds and thus to accumulate more scarce financial revenues to pay for state budgetary programs. The same objective prompted planners' earlier decision to make scientific organization financially independent from the state budget in the mid-1960s.

The inquiry then can be limited to those few civilian scientific programs (apart from operational expenditures on agricultural services, industry and geology) that have remained dependent on the state budgetary support. These programs include the exploration of space, basic research financed with All-Union and All-Republic budgetary funds, and weather bureaus, whose funding however is small in size. The available evidence indicates that outlays on basic research, have comprised 9 percent of all current outlays on science.⁴⁵ All-Union budgetary

outlays on space and defense research programs hence can be estimated as the difference between the reported total for budgetary outlays on science and outlays on basic research. During the observed period outlays on space and defense research have comprised 63-66 percent of total outlays on science. It is arbitrarily assumed here that no more than 20 percent of the total science budget is allocated for space programs. This assumption, however, has little effect on estimation results because most Soviet space activities are defense-related. Overall, it appears that allocations on defense-related science have comprised at least 60 percent of all allocations on science.

Defense Budget. The composition of the official defense budget also has been the subject of much speculation among Western observers for decades. The discussion has centered on the issue as to whether the official figure for defense represents a certain part of the total defense budget or the amount of rubles arbitrarily chosen by planners for ideological reasons. Despite its popularity, the issue has never been explored beyond speculative observations because Western researchers have failed to integrate budgetary and national income accounts.

This study's results indicate that until 1970 the official defense budget corresponded to the actual budget of the USSR military administration--the Defense Ministry, KGB, and the Ministry of Internal Affairs. After 1970 the official defense budget unbelievably declined by 0.3 billion rubles by the late 1970s. In contrast, the actual defense budget more than doubled during the 1970s. It appears that the difference between the real and official defense budget has begun to be financed by means of budgetary deficits in 1971.

The actual defense budget represents around 30 percent of total military expenditures. The remaining 70 percent is hidden in the *fne*, outlays on science and the second budgetary residual which is discussed below. The actual defense budget excludes weapons production, investment into defense industry, and defense R&D. It includes all expenditures connected with maintaining the armed forces and military construction. If one analyzes the state budget from the institutional perspective, then the official defense budget is used to represent the actual budget of the Soviet military. Soviet authors writing on the official defense budget incorrectly assumed that it includes payments for weapons.⁴⁶ Soviet planners never refute this assumption because it leads to the gross underestimation of total military expenditures. The military are exempt from paying for defense R&D and production which are financed from the same All-Union budget.

Second Residual. As opposed to the *fne* residual, the state budgetary residual has been completely ignored by Soviet authors. It can be estimated as the difference between total outlays and the sum of all officially listed components. Since the All-Union budget constitutes the only source of financing defense activities, the All-Republic budgetary residual pertains to civilian activities whose nature cannot be ascertained with the desired precision. Circumstantial evidence based on studies of Soviet finances indicates that the All-Republic budgetary residual contains funds allocated for financing monetary and material reserves of local governments. By the same token, the All-Union budgetary residual contains funds allocated for financing centralized reserves.

It is this author's belief that the All-Union budget includes only an insignificant part (around 10 percent) of the total additions to state reserves, a part which is formed under control of the USSR Council of Ministers. The entire addition to foreign currency reserves, which in 1980 amounted to these 4.8 billion rubles, is either transferred to banking institutions or never registered as budgetary revenues in the first place. If the latter is the case, then this author underestimated emission of new money by 4.8 billion rubles. All extra revenues accumulated in the All-Union budget are transferred to the All-Republic budget or banking institutions. In 1980, total additions to reserves amounted to around 2.3 (2.1 + 0.2) billion rubles, while the unknown component of military expenditures equaled 13.9 (15.2 - 2.3) billion rubles.

6.2.3 Credit Flows

Similar to budgetary flows, credit flows are analyzed in terms of revenues and outlays. Revenues include all new deposits in state banks that are available for credit purposes--additions to household savings, unused budgetary funds, and credit payments made by enterprises and foreign governments. Outlays are divided into long- and short-term credits issued to civilian enterprises for financing capital investment and working assets. A very insignificant amount of credits is also issued to households for investment and consumption purposes. As in the case of the state budget, deficits signify the excess of credit outlays over revenues. Data on household savings, unused budgetary funds, long- and short-term credits are regularly included in the official statistics. Payments made by enterprises are estimated as the difference between new credits and net additions to total outstanding credits.

END NOTES

¹ For the detailed discussion of the subject refer to M. Solodkov, ed., *Neproizvodstvennaya Sfera SSSR*, (Moscow: Mysl', 1981), pp. 5-41.

² Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), pp. 475-479.

³ The relationship between the state budget and banking sector does not take the form of subsidies that characterizes budgetary financing of household services. In the official statistics the state budget collects profits earned by the banking sector but then transfers extra revenues (the difference between total revenues and outlays) back to the banking sectors. These revenues are supposed to serve as an additional source of financing credit flows. In reality, the state budget never accumulates extra revenues because official revenues much exceed actual revenues received from enterprises and households and because actual outlays much exceed official outlays.

⁴ See Gosplan, pp. 476 and 477.

⁵ It is assumed in this study that money collected from households are used to finance only current outlays of budget-supported sectors. This assumption is based on the observation that even production enterprises have a limited responsibility in financing capital repair outlays of service sectors.

⁶ The author of this study initially made the same conceptual error, which is actually difficult to avoid because TSU officials never explain how they compile the NKh table on total public outlays on household service and science sectors.

⁷ See V. Garbuzov, et al., *Problemy Razvitiya Sotsialisticheskikh Finansov*, (Moscow: Finansy, 1977), p. 161, and V. Garbuzov, ed., *XXVI S'yezd KPSS i Sotsialisticheskie Finansy*, (Moscow: Finansy i Statistika, 1982), p. 261.

⁸ V. Rutgaizer, *Resursy Razvitiya Neproizvodstvennoi Sphery*, (Moscow: Mysl', 1975), p. 207, and V. Mayer, *Uroven' Zhizni Naseleniya*, (Moscow: Nauka, 1979), p. 15.

⁹ In the previous section this profit was estimated as that of other service sectors. It is unclear how planners register profit earned by organizations serving foreign tourists in the Soviet Union. Since this profit is earned in domestic rubles, it must be compiled in the same way as revenues of other tourist organizations which are treated by planners as part of the health sector.

¹⁰ See Table 5D3 in Volume II.

¹¹ According to V. Galanov, *Svodnyi Finansovyi Balans*, (Moscow: Finansy, 1983), p. 92, automobile transportation organizations pay only 2 percent from their gross income for road maintenance. Deductions of other production enterprises must be even smaller.

¹² Rutgaizer, p. 202.

¹³ See data on everyday services in *Vestnik Statistiki*, No. 8, 1973, p. 76 and NKh 1974, p. 673.

¹⁴ Rutgaizer, p. 164.

¹⁵ These estimates are based on the analysis of T&C employees serving household and budgetary sectors presented in Section 9.

¹⁶ Although some T&C household services are also financed by foreign tourists and public organizations (in addition to compensations for business trips which are counted as part of household revenues), the size of this financing is quite insignificant and thus can be safely ignored.

¹⁷ Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*, (Novosibirsk: Nauka 1981), p. 73, mentioned methodological differences between national income accounts, employment and financial statistics but failed to explain how these differences are connected with his underestimation of T&C services.

¹⁸ See Rutgaizer, pp. 163 - 165.

¹⁹ These outlays were reported in the NKh table on the structure of consumption fund which TSU officials decided to conceal starting in 1976.

²⁰ See I. Shutov, *Lichnoe Potreblenie Pri Sotsializme*, (Moscow: Mysl', 1972), p. 170, and M. Solodkov, p. 249.

²¹ U.S. Central Intelligence Agency, *USSR Gross National Product Accounts, 1970, Research Aid, A* (ER) 75-76, November 1975, p. 41.

²² See Sverdlik, p. 71.

²³ As in the case of T&C services, communal services also receive revenues from foreign tourists. It is assumed here that Soviet authors quote information that applies only to Soviet households and that the volume of communal services provided to foreign tourists consists primarily of net profits.

²⁴ More detailed information on nonproductive everyday services than that reported in the NKh can be found in *Vestnik Statistiki*, No. 7 1985.

²⁵ See P. Maslov, ed., *Statistika Finansov*, (Moscow: Statistika, 1979), p. 173. For the detailed account of insurance activities in the agricultural sector refer to V. Semenov, *Finansovo-Kreditnyi Mekhanizm v Razvitii Sel'skogo Khozyaistva*, (Moscow: Finansy i Statistika, 1983), pp. 107-110. As listed in Garbuzov (1982), pp. 372-373, households paid 7.7 billion rubles to and received from insurance 5.4 billion rubles. Most of the difference in the amount of 2.3 billion rubles (7.7-5.4) can be considered as the net profit of insurance agencies. As estimated in Table 5B1, the total net profit of insurance and banking sectors amounted to 2.1 billion rubles. It thus appears that insurance agencies earn most of the profit of this sector.

²⁶ Labor and wage statistics of the administration sector exclude budget-supported T&C services which are treated as part of the entire T&C sector (see footnote 15 above).

²⁷ See notes in the beginning of the NKh table on productive and nonproductive labor published during the 1960s.

²⁸ See the discussion of this sector's capital stock in Section 4.

²⁹ See Table 10B in Volume II.

³⁰ CIA (1975), pp. 40 - 41.

³¹ One of the best attempts in Soviet literature to reconcile these two methodologies can be found in Galanov, pp. 90 - 99.

³² N. Sychev, et al., *Finansy SSSR*, (Moscow: Finansy, 1979), p. 141.

³³ G. Darkov, and G. Maksimov, *Finansovaya Statistika*, (Moscow: Finansy, 1975), p. 57, and P. Maslov, ed., p. 47.

³⁴ Semenov, p. 59. Also see Semenov's article in Garbuzov, (1977), p. 262.

³⁵ V. Yevdokimov, *Kontrol'za Ispolneniem Gosudarstvennogo Byudgeta SSSR*, (Moscow: Finansy, 1974), p. 141.

³⁶ Garbuzov, p. 43.

³⁷ See Darkov, and Maksimov, pp. 16 - 18.

³⁸ Yevdokimov, p. 141.

³⁹ Semenov, pp. 179 - 180.

⁴⁰ Data on geological works is reported regularly in the NKh; according to G. Shmelev, *Lichnoe Podsobnoe Khozyaistvo i Ego Svyazi s Obshchestvennym Proizvodstvom*, (Moscow: Mysl', 1971) p. 147, budgetary outlays on forestry comprise 0.7 billion rubles.

⁴¹ See V. Pavlov, ed., *Gosudarstvennyi Byudzheth SSSR*, (Moscow: Finansy, 1980), p. 116.

⁴² Semenov, p.178.

⁴³ NKh 1982, p. 510.

⁴⁴ L. Berri, *Planirovanie Narodnogo Khozyaistva SSSR*, 2nd Edition, (Moscow: Ekonomika, 1973), p. 457, 461.

⁴⁵ Cited in V. Zhamin, "Yedinstvo Nauchno-Tekhnicheskoy Politiki," *Voprosy Ekonomiki*, No. 12, 1984, p.21.

⁴⁶ See Shmelev, p.314.

7.0 HOUSEHOLD BUDGETS

This section unifies Soviet national accounts with respect to household monetary, production, consumption and investment activities. Planners analyze household budgets within the framework of the financial, GSP and national income balances. The financial balance contains data on all sources of household monetary income and its transfer to the public sector and within the household sector.¹ The GSP balance contains data on the flow of goods connected with household production, consumption and investment activities.² Finally, the national income balance contains data on all activities of production, nonproduction and defense households.³ This three-way division is performed proportionally to income received by employees working in civilian production, service and defense sectors. Recipients of pensions, allowances and stipends contribute to financial resources of the non-productive sector. The outcome of planners' analysis of household budgets is the compilation of the composite index illustrating changes in population's standard of living.⁴

Total monetary income in current rubles constitutes one of the most protected Soviet state secrets because it includes income received by defense households. Since no information on this income can be obtained from Soviet sources, it is impossible to estimate total monetary income of all households as the sum of all its components.⁵ There exist, however, two indirect approaches that lead to total monetary income. The first approach is based on data connected with Soviet family budgets that is published in percentage terms, while the second approach is based on the observation that total income equals the sum of outlays and additions to savings. The estimation procedure thus centers on the conversion of data on family budgets from percentage to value terms as well as on deriving data on purchases of goods and services and additions to unorganized savings. The two approaches are not completely independent of each other because data on unorganized savings can be derived only from published family budgets. After successfully combining the two approaches, one can estimate monetary income of defense households as the difference between the derived total and the sum of monetary income received by civilian production and nonproduction households. The percentage between income of defense households and total income corresponds to the share of these households in total consumption of goods and services.

7.1 HOUSEHOLD INCOMES

Households receive income from the public sector in five ways: total wages (wages and other wage-type revenues); income received from social consumption funds (pensions, allowances and stipends); monetary income received by private agricultural producers; income received from financial institutions (insurance premiums, interest from savings, bonds and lotteries, and bank credits); and various types of small revenues received from other sources. The latter include revenues from sales of used goods to non-agricultural procurement organizations, compensations for donating blood, for injury induced during work, and for demolished homes and gardens. Even though no precise data on these small

revenues has been published, it can be safely assumed not to exceed 0.2-0.3 billion rubles a year.⁶

Total wages of civilian production employees are estimated in Section 5 as the sum of regular wages and other earnings paid by state-cooperative and collective enterprises. Non-monetary wages of collective farmers (around 6 percent of their total wages) are excluded from total monetary income of households.⁷ Monetary income of private agricultural producers received from the public sector equals the difference between their total gross income and sales of produce to other households. Transfers of monetary income within the household sector do not contribute to its total monetary income which can be received only from the public sector. Total monetary income of private producers is estimated in Section 3 as the sum of revenues received from sales to procurement agencies and at ex-village and in-village markets. Market sales to households are estimated as the difference between total market sales and market purchases by public organizations.⁸

While non-monetary wages, monetary income received from other households, and non-monetary income of private producers are excluded from the total monetary income, these revenues represent goods available to households for end use and hence increase household consumption and investment of national income. Non-monetary income of private producers is also estimated in Section 3 for agricultural, construction and other sectors.

Wages received by employees of service sectors are estimated in Section 6 using data on the number of employees and their average salary. Other earnings of employees working in profit-seeking services can be assumed to equal 2.8 percent of total wages as in the civilian production sector. Budgetary statistics indicate, however, that other earnings are quite insignificant in size in budget-supported sectors. Data on total pensions, allowances and stipends is listed in the NKh table on social consumption funds. For the purpose of analyzing published family budgets, these funds must be divided into state-cooperative and collective sectors using the NKh data on average annual wages of state cooperative employees which are presented with and without these funds. One thus obtains data on these funds for state-cooperative employees and then for collective farmers. The derived total for collective farmers can be combined with data on the structure of these funds in collectives presented in Mikul'sky (1982) to derive their monetary income received from these funds.⁹

Monetary income received from financial institutions is divided into income received from state insurance, credit and banking sectors. Data on state insurance premiums can be found in several Soviet sources.¹⁰ Data on interest income and regular bonds is reported in Sverdlik (1981) for the period ending in 1975. While regular bond payments are quite small in size, interest income increases in proportion to that of household saving accounts. Sverdlik's data hence can be extrapolated for the post-1975 period with an insignificant margin error.¹¹ Major difficulties arise with respect to delinquent post-war bonds which the Soviet state began to repay in 1975. Igor Birman suggests that the annual repayment of these bonds reached as much as 2.0 billion rubles during the 1970s. The author of the present study only made a superficial inquiry by reading Soviet newspaper listings on the repayment of delinquent bonds and by interviewing former Soviet

citizens who emigrated after 1974. While a more thorough inquiry may be necessary, there are already strong indications that Birman's figure constitutes the maximum amount of the delinquent bond payments. The average annual amount of these payments apparently did not exceed 1.3-1.5 billion rubles.

7.2 HOUSEHOLD OUTLAYS

Household outlays are divided into retail trade purchases, utility payments, village trade purchases, payments for services (T&C, housing, communal, non-productive everyday, cultural, education, health, and sport), membership dues (political and public organizations), all outlays on cooperative housing, purchases of insurance policies, all types of taxes, and other payments to financial institutions (bonds, lotteries, and other payments to the state budget, and credit payments).

Each category of household outlays is estimated in the appropriate Section of this study dealing with the flow of goods and the distribution of national income. Retail trade purchases are estimated as the difference between total purchases and those made by public organizations. Data on utility payments and in-village markets is obtained from secondary Soviet sources.¹² Payments for profit-seeking services are estimated as the sum of components comprising their total volume. Data on paid housing, education, health-sport and insurance services is also obtained from secondary Soviet sources. CIA analysts estimated membership dues for 1970.¹³ The ratio between dues and the total volume of administration services is then extrapolated for the rest of the observed period. Outlays on cooperative housing are approximately equivalent to investment and capital repair in the cooperative housing sector that are estimated in Section 3 and 4 respectively. All revenues received by the state budget from households are estimated in Section 6 on the distribution of national income.

Planners divide household purchases of material wealth into four components: production materials purchased at retail trade stores, ex-village and in-village markets; consumption items produced during the current year; used goods; and investment into agriculture and housing. Production materials are included in the intermediate product, new consumption items and investment--into corresponding GSP and national income components. Purchases and sales of used goods constitute the transfer of monetary income within the household sector. Purchases of these goods thus must be excluded from the balance of household income and outlays. Consumption items include purchases at retail trade stores and ex-village markets, utility payments, and consumption-in-kind estimated in Section 3. The consumption fund of national income estimated by planners also includes the value of depreciated residential housing which is discussed in Section 4. The total official fund of household consumption (reported before 1976) much exceeds the actual size of household consumption. As discussed in Section 11 on Soviet military expenditures, TSU officials hypocritically treat all purchases of material wealth by the armed forces as part of household consumption.

7.3 HOUSEHOLD SAVINGS

Household savings include organized savings deposited in the state bank, purchases of bonds, and unorganized savings held by households outside state control. While organized savings are regularly reported in the official statistics, unorganized savings are treated as the state secret. There has never been a single instance when the Soviet author has displayed any knowledge of unorganized savings, with the partial exception of one work by Kashin (1979), which unfortunately was not available during the preparation of the present study. This work, however is quoted by another Soviet economist, Sverdlik (1981), to the extent that Kashin's ratio between household savings and income equaled 3.9 percent in 1960, 5.5 percent in 1965, 5.8 percent in 1975, and 7.4 percent in 1975.¹⁴

Kashin based his estimates on published family budgets. What undermines the precision of his estimates is his assumption that families of workers have family budgets that are similar to combined budgets of workers and service persons. This assumption is easily refuted by the comparison of the NKh data on these budgets that began to be published in 1980 and hence was unavailable to Kashin during his research. While Sverdlik complains that the problem with the increasing savings-income ratio has been subject of theoretical rather than quantitative inquiry among Soviet economists, he fails to offer his own estimates.¹⁵

As was mentioned above, Soviet officials conceal information on annual additions to unorganized savings in order to make it impossible to estimate total monetary income of households. Soviet authors recognize the existence of three potential sources of knowledge on the subject: Gosplan's balance of household income and outlays, State Bank's reports on the circulation of monetary resources, and TSU reports on family budgets of industrial workers and collective farmers.¹⁶ What they fail to explore are the reasons why among these sources only TSU reports are made available to them. These reasons are not difficult to find. When Soviet authors traditionally relied on family budgets of industrial workers they distorted overall household saving trends compared to those of average family budgets of workers and service persons, which TSU officials began to publish only in 1980. The comparison of these budgets indicates that the family of workers saves proportionally 1 percent more of its income than the family of workers and service persons. Budgets of the latter are much more characteristic of the Soviet population outside the collective sector than budgets of the former.

One must conclude that the publication of the NKh data on the family of workers and service persons in 1980 was a significant weakening of the TSU secret code in the area of household budgets. TSU officials apparently made their decision on the basis of two considerations. First, the official data base on household budgets that existed before 1980 was completely inadequate for performing even a superficial analysis of economic trends in the household sector in percentage terms, not to mention value terms. Second, TSU officials did not perceive that their decision would lead to any notable breach of the state secrecy act because they continued to publish data in percentage terms and because the gap between total household income and that of civilian households much widened during the 1970s. Thus, they justifiably assumed that most Soviet economists would be able to use new data only in percentage terms due to their lack of knowledge about the existence of such a gap in the first place. Indeed, the

prediction of TSU officials proved to be correct. Since the publication of new data on family budgets, Soviet economists have not extended their analyses beyond percentage points, at least in the openly published literature.¹⁷

While it is difficult to evaluate the exact statistical bias of published family budgets, the expressed scepticism about their uselessness for making precise estimates appears to be overly exaggerated. According to Nazarov (1982), TSU officials make a considerable effort to organize the collection of information on family budgets in line with the most strict canons of statistical surveys.¹⁸ The number of surveyed families--62 thousand--is large enough for running reliable significance tests. In addition, TSU officials follow a standardized procedure in selecting families on a random basis from different regions of the country and different social classes. Overall, the results of the TSU survey should approximate those categories of household budgets that comprise 10 percent of the total with the margin of error below 0.1 percent. Since savings comprise 5 percent of the total, the margin of error should not exceed 0.05 percent or 0.2 billion rubles, which is acceptable for the purposes of this study. The attention now turns to a more detailed study of published family budgets.

7.4 TSU FAMILY BUDGETS

The NKh data on family budgets of workers and service persons covers the following years: 1965, 1970, 1975, and 1980 to the present. The NKh data on family of workers and collective farmers is available for all years of the observed period, except for 1973-1974. The procedure is first to continue the established trend to fill the data gap for these two years. Then, data on family of workers and service persons can be obtained by comparing the difference in income and consumption trends between households of workers on the one hand and workers and service persons on the other. Since the above differences are below 3 percent, the extrapolation of the comparative trend should not lead to the error above 0.1 percent for intervening years.

The NKh table on the family budget of workers and service persons has the following entries: total wages; pensions, stipends, allowances and other payments and benefits received from social consumption funds; income from private production; and income from other sources; outlays on food; outlays on clothes and shoes; outlays on furniture, cars and other heavy industrial products; outlays on construction materials; outlays on fuel; outlays on social, cultural, and everyday services, including free services paid from social consumption funds; rent, utilities, and maintenance of private homes; savings and investment; taxes and membership dues; and other outlays. The NKh table on the family budget of collective farmers includes an additional entry for wages of family members who are workers and service persons but excludes the entry for utilities and housing maintenance.

No data has ever been published on any of the above entries in value terms. Those economists who assume that the official statistics provide the complete coverage of wages overlook the fact that this coverage excludes not only other earnings but also monetary income received by persons working in the defense sector. It seems that the most precise, if not the only, approach to

converting the NKh tables from percentage to value terms lies in combining the NKh data on social consumption funds (SCF) and wages received by collective farmers.

It is known that other earnings of collective farmers received as a supplement to regular wages are quite small in size (around 0.1-0.2 billion rubles).¹⁹ At the same time, the total SCF of workers and service persons can be estimated as the difference between their total wages and wages that exclude the SCF, both of which are regularly reported in the NKh. The total SCF of workers and service persons exceeds the SCF included in the family budgets of these persons by the amount of the SCF received by family members of collective farmers working in the city. In order to avoid double counting of vacation payments and one-time bonuses which are treated as regular wages, the officially reported total SCF must be reduced by the amount of these wages. Also excluded from personal income are housing subsidies that are included in the total SCF.²⁰

The estimation procedure involves the following steps. First, one derives total income of collective farmers using the percentage ratio between their total wages and income. Second, one converts all entries in the NKh table on collective farmers from percentage to value terms, including the entry for the SCF. Third, one estimates the SCF of workers and service persons in two ways: as the difference between total SCF and those that increase income of collective farmers; and using data on wages. For 1980, the discrepancy is -0.3 (86.0-86.3) billion rubles. This discrepancy is assumed to be the result of treating some family members of collective farmers as workers and service persons in the estimation of wages. It thus appears that official family budgets are much more precise than one would suspect. Fourth, one uses the derived data on the SCF of workers and service persons to obtain their total income and then all other items on the family budget list in value terms. Fifth, one combines two family budgets to obtain the unified family budget for the entire Soviet population.

In 1980, total income equaled 420.0 billion rubles, total wages--293.1, income from private production--22.6, other income--9.8, agricultural investment and savings--22.1, and other outlays--24.6 billion rubles. In 1980, monetary payments from the SCF equaled 46.8 billion rubles, other monetary income was 5.6, and net monetary income of private producers received from the public and private sectors equaled 8.3 and 5.0 billion rubles, respectively. During the same year total household purchases at retail trade stores, utilities, services (including rents and membership dues), transfers to the state budget and outlays on cooperative housing equaled 255.5, 3.2, 44.5, 26.5, and 2.5 billion rubles respectively; together these outlays comprised 332.2 billion rubles. Total wages reduced by additions to savings can be estimated in the following way: $332.2 - 46.8 - 8.3 - 5.6 = 271.5$. Total savings then equaled 21.5 ($293.0 - 271.5$) billion rubles. This leads to the agricultural investment in the amount of 0.6 billion rubles, which is somewhat larger than the amount of investment into livestock and gardening estimated in Section 3. The margin of error, however, is below 0.5 billion rubles. The independently estimated total net product in private agriculture equaled 27.6 billion rubles. Planners justifiably avoid double counting of 5.0 billion rubles in estimating total monetary income from private agriculture for the entire household sector.

The above two tests for wages and private agricultural income give credence to the estimation of total annual additions to savings based on the published family budgets. Since annual additions to organized savings and purchases of bonds equaled 10.3 and 0.6 billion rubles respectively in 1980, annual additions to unorganized savings equaled around 10.1 billion rubles. Total monetary wages of civilian production and service employees equaled 258.5 (197.2+61.3) billion rubles, which are smaller than total wages of all employees by 34.5 billion rubles. It is assumed in this study that the above discrepancy between total and civilian wages can be explained by nothing else than wages of employees working in the defense sector. The proposed procedure for estimating defense wages can be repeated for other years of the observed period. During the 1970s, the ratio between defense and total wages increased from 10 to 12 percent, while the ratio between defense wages and total monetary income of households increased from 8 to 9.5 percent.

7.5 THE STANDARD OF LIVING INDEX

Gosplan officials provide a detailed account of how they estimate the standard of living index for the entire Soviet population as well as for families of workers and service persons on the one hand and for families of collective farmers on the other.²¹ Planners begin their estimation procedure by accounting for total monetary income, except for revenues from private agriculture, received by households during a given year. This total is then reduced by the amount of all net transfers to the service, budgetary and credit sectors as well as by total additions to savings and payments to housing cooperatives.

In this study, all membership dues and purchases of insurance policies less premiums are treated as transfers to the service sector, while purchases of bonds are treated as transfers to the state budgetary sector. The balance of annual additions to issued credits which households receive for housing construction and purchases of expensive consumer goods were quite small in size--around 0.1 billion rubles--until 1981, when they reached 0.3 billion rubles largely due to the increasing construction in the countryside.²²

Planners perform the above estimation procedure in order to estimate net monetary income available to households for purchases of goods. This income is then increased by the net product of private producers, material and depreciation outlays of sectors serving households, including utilities, and by the gross output of the cooperative housing sector. In the end, planners arrive at the total real income of households. Per capita income in current prices is estimated as the ratio between this total and the average annual size of the Soviet population. In order to compare changes in the derived ratio during the observed period, planners convert the value of purchased goods, the net output of private producers, material and depreciation outlays, and the gross output of the cooperative housing sector from current to constant prices.

While there is a sufficient data base to duplicate planners' estimates in current prices with the required precision, the lack of data on price indexes for goods and services much complicates the task of deriving growth rates of Soviet living standards. One way of accomplishing this task is to divide it into parts that

can be handled independently of each other. Thus, the agricultural and construction price indexes compiled in Section 3 can be used to convert all components of the total real income, except for goods and services, from current to constant prices. The construction price index also can be used for converting the depreciated value of buildings and installations operating in service sectors. In turn, the derived industrial price indexes can be used to convert the value of material inputs and depreciation of machines operating in service sectors. The unreliable official retail trade price index unfortunately provides the only perspective on prices changes regarding purchased goods. The estimation results indicate that the regularly reported NKh "real income" index is also based on the official retail trade price index. The alternative indexes that avoid shortfalls of official indexes are proposed in the concluding analysis of Soviet economic trends.

END NOTES

¹ In this study, transfers within the household sector are analyzed only for the purpose of avoiding double counting of household monetary revenues received from the public sector. See Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo* (Moscow: Ekonomika, 1974), pp. 454-465, and 470.

² Ibid, pp. 613 and 634.

³ The discussion of the three-way division of household activities naturally cannot be found in planning manuals where the discussion is limited to families of workers and service persons on the one hand and collectives on the other--see Gosplan, (1974), pp. 466-470. However, methods applied by planners to the study of the above two social groups can be also applied to the study of family budgets of workers and service persons engaged in productive, nonproductive and defense activities. If defense labor does not contribute to the production of the GSP and national income, then planners must analyze activities of defense households separately from those which derive their income from civilian production activities. TSU officials are known to calculate total revenues of the civilian production labor which are known in the Marxist economic parlance as "v". Soviet authors continue their debates on the real boundaries of "v" which contain not only revenues for personal use but also benefits received through social consumption funds. NKh editions published before 1975 include the table on the end use of national income which includes the entry for the productive labor. All these pieces of evidence indicate that in theory planners must track activities of defense households separately from those of civilian households. Whether they apply planning theory the way it is suggested in the present study cannot be ascertained.

⁴ See Gosplan (1974), pp. 469-474.

⁵ NKh editions published before 1975 include data on total financial revenues received by households over several years in constant prices. Since the TSU price index for household revenues has never been published, the NKh data on total revenues cannot be used with any precision for analyzing current household activities in current prices.

⁶ The real figure for other revenues may not exceed 0.1 billion rubles. This author added additional 0.1-0.2 billion rubles in case there exist other unknown revenues of a significant size which are excluded from both regular and bonus wages, such as special awards and compensations stipulated in provisions of the Presidium of the Supreme Soviet.

⁷ U. S. Central Intelligence Agency, *USSR Gross National Product Accounts, 1970, Research Aid*, A (ER) 75-76, November 1975, p. 23.

⁸ Refer to the discussion of retail trade activities in Section 4.

⁹ K. Mikul'skiy, ed., *Obshchestvennye Fondy Potrebleniya Pri Sotsializme*, (Moscow: Ekonomika, 1982), p. 127.

¹⁰ For example, see V. Garbuzov, et al., *Problemy Razvitiya Sotsialisticheskikh Finansov*, (Moscow: Finansy, 1977), pp. 322-330, and V. Garbuzov, ed., *XXVI S'yezd KPSS i Sotsialisticheskie Finansy*, (Moscow: Finansy i Statistika, 1982), pp. 370-373.

¹¹ Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*, (Novosibirsk: Nauka, 1981), pp. 204-205.

¹² Ibid, p. 71, and A. Volkov, "Fond Lichnogo Potrebleniya v Staticheskome Mexhotraslevom Balanse Obshchestvennogo Produkta," *Ekonomika i Matematicheskie Metody*, Vol. 4, No. 5, 1968, p. 729. See Tables 3B1, and 2B2 in Volume II.

¹³ CIA (1975), pp. 40-41.

¹⁴ Sverdlik, p.173.

¹⁵ Ibid, pp. 174-175. Instead he focuses his discussion on the main reason for continuing increases of household savings--the unsatisfied consumer demand.

¹⁶ For an excellent discussion of data collection on household savings refer to N. Rimashevskaya, ed., *Statisticheskie Metody v Issledovaniyakh Truda, Dokhodov i Potrebleniya*, (Moscow: Nauka, 1981), pp. 82-101.

¹⁷ Ibid, p. 91, includes an explanation as to why TSU family budgets are not used by Soviet economists for deriving data on unorganized household savings. TSU surveys are supposedly inadequate with respect to selecting the most representative group of families and overcoming the distortive effect of cyclical fluctuations of monetary resources. The reason cited by Soviet authors is that the actual additions to unorganized savings are much larger than those derived from TSU family budgets. Given Soviet authors' underestimation of total household revenues, it is not surprising that they reached the above conclusion.

¹⁸ M. Nazarov, ed., *Kurs Sotsial'no-Ekonomicheskoi Statistiki*, (Moscow: Finansy i Statistika, 1982), pp. 418-420.

¹⁹ This is because collectives have a limited bonus wage system and limited travel engagements.

²⁰ See Gosplan (1974), pp. 462-463.

²¹ Ibid, pp. 466-469.

²² See NKh 1982, p. 526.

8.0 FOREIGN TRADE IN GOLD AND DOMESTIC RUBLES

While Soviet officials always list exports and imports in gold rubles, which are not in circulation, all Soviet national accounts contain data on foreign trade in domestic rubles. The TSU secret code in the area of foreign trade is designed to make it impossible to analyze (1) real production and consumption trends; (2) the price mechanism by which Soviet consumers pay for military programs; and (3) the dependency of the domestic economy on foreign markets. The explosion of Soviet foreign trade activities during the 1970s makes the problem of converting the value of exports and imports from gold to domestic rubles one of the most urgent in the area of Soviet statistics.

This section's objectives are four-fold: 1) to discuss the procedure by which Soviet officials exchange domestic rubles for CEMA "convertible" rubles and for foreign currencies that are in circulation outside the CEMA bloc; 2) to untangle controversies about the place of foreign trade indicators in the NEB; and to evaluate two previous studies that addressed this problem--one written by Sverdlik (1981) and another by Trembl and Kostinsky (1982);¹ 3) to propose an alternative estimation procedure based on the comparative analysis of Soviet national accounts; 4) to review the derived results and their usefulness in analyzing the entire official Soviet statistics.

8.1 DOMESTIC, CEMA AND WORLD PRICES

Planners control all foreign trade activities in a centralized way, thus diminishing the impact of chaotic world market forces on the domestic price system. This control is most typically characterized by a complex system of monetary exchange based on three types of currency: the domestic ruble, the convertible ruble and the gold ruble. The most confusing aspect of the above system is that both the convertible and gold rubles are not in circulation, functioning as yardsticks for measuring the relative value of goods with respect to the domestic economy, economies inside and outside the CEMA bloc.

All Soviet foreign trade agencies maintain accounts in the USSR State Bank and Vneshtorg Bank, which specializes in financial transactions with the outside world. When these agencies purchase from or sell to domestic distributors, the currency in operation is the domestic ruble. When these agencies deal with foreign distributors their accounts are automatically treated by banking officials as gold ruble accounts. The USSR State Bank issues monthly reports (published in two Soviet newspapers Izvestiya and Ekonomicheskaya Gazeta) on the exchange rates between the gold ruble and foreign currencies. Banking officials apply these rates to convert accounts of Soviet agencies into foreign currency accounts. The gold ruble thus serves as a buffer between the outside and domestic monetary orders.

The monetary system existing within the CEMA bloc is such that business transactions never involve the exchange of gold rubles into the national currencies of other CEMA bloc countries. The medium of exchange within the CEMA bloc is the convertible ruble. The general procedure by which the convertible ruble is

converted to the gold ruble and to currencies of other CEMA countries is discussed in the Soviet literature, though no details are provided.² This procedure dates back to 1961 when planners devaluated the domestic ruble and introduced a fixed ruble-dollar exchange ratio. According to Soviet authors, they substantiated this ratio with a thorough analysis of the comparative purchasing power of the ruble and the dollar. No information exists on the substance of this analysis, except that planners compared the two economic structures in their entirety, including production of producer and consumer goods and services.³

As a result of this analysis, the dollar-ruble ratio was fixed at 1.11, which served as a measure for determining the gold content of the ruble compared to that of the dollar. Since the gold content of the dollar was 0.887671 g. in 1961, the gold content of the ruble became 0.987412 g. and it has remained the same ever since. In 1963, the CEMA countries decided to make the gold content of the convertible ruble equal to that of the gold ruble. In 1970, experts working in the CEMA Permanent Commission for "currency-financial questions" completed a complex analysis whose results confirmed that this equivalence between the gold contents of the gold and convertible ruble was politically as well as economically justified.⁴ Following two devaluations of the dollar in December of 1971 and February of 1973, the ratio between the convertible ruble and the dollar was fixed at 0.7461, where it has remained ever since.

In 1978, CEMA experts made another thorough review of this ratio on the basis of the comparative analysis of the volume and structure of trade turnover with the U.S. but decided to leave this ratio unchanged.⁵ It remains unclear whether CEMA experts decided that the gold content of the convertible ruble should be stabilized or if they detected no significant changes in their analytical results or both. The latter would indicate that, given the large fluctuations of world prices, CEMA experts made a serious attempt to keep contract prices negotiated within the bloc in line with world prices.

This attempt could be traced to the major objectives of the CEMA Complex Program to "create conditions for the stabilization of the gold content of the convertible ruble for an extended period of time...to expand the volume of exports, to improve the quality of exported goods, to create foreign currency and commodity reserves..."⁶ Konstantinov (1982), a Soviet expert on the subject, emphasized that the fixed ratio between the convertible ruble and the dollar distorts the relative purchasing power of these two currencies because of the dollar's floating gold content. In other words, prices negotiated within the CEMA bloc do not exactly follow world prices. This explains why the CEMA Bank, called "MBES," introduced its own floating exchange rates between the convertible ruble and thirteen major Western currencies in addition to the fixed ratio mentioned above. In July of 1978 the MBES began to publish monthly estimates of "floating exchange rates based on the method of weighted averaging of currency baskets and world market currency fluctuations," which was originally introduced by the USSR State Bank in 1977.⁷

Similarly, the Soviet policy has been the total abandonment of fixed rates between the gold ruble and the dollar. Following the two devaluations of the dollar on December 18, 1971, and February 12, 1973, the ruble-dollar ratio fell to 0.829 and to 0.746.⁸ After the Bretten-Wood system collapsed and the value of the

dollar was no longer officially tied to the price of gold, Soviet planners introduced monthly floating exchange rates based on changes in the relative purchasing power of the two currencies and the changes in the dollar price of gold. In 1975, the average annual ruble-dollar exchange rate fell to 0.720 and in 1976 it climbed again to 0.754, which approached the 1974 level. It declined to 0.736 in 1977 and to 0.681 in 1978.⁹ The temporary increase of the ratio in 1976 can be apparently attributed to changes in the Soviet domestic price indexes and to the depletion of Soviet foreign currency reserves following the agricultural fiasco of 1975, which prompted huge grain imports. The steady decline of the ruble-dollar ratio points to the presence of some correlation between world prices and domestic prices. This is illustrated in Table 8-1 below which combines the data listed in Glushkov and Deryabin (1983) and Mitrofanova (1978).¹⁰

**Table 8-1 EXPORT PRICE INDEXES OF WORLD, CONTRACT
AND DOMESTIC PRICES FOR THE USSR**

	1970	1971	1972	1973	1974	1975	1976	1977
Fuel, raw and other industrial materials								
World prices	100	108	111	168	243	247	258	264
Contract prices	100	105	110	113	119	175	177	185
Domestic prices	100	99	99	99	96	96	96	
Agricultural Raw materials and food products								
World prices	100	103	121	176	216	201	203	229
Contract prices	100	96	107	108	111	135	148	150
Domestic prices	100	103	104	106	107	111	109	
Machines & Equipment								
World prices	100	103	112	117	128	141	148	155
Contract prices	100	101	108	105	116	127	145	151
Domestic prices	100	97	106	105	117	119	122	

Although this table covers only three categories of exported goods, the value of these goods comprises generally more than 90 percent of all Soviet exports. The missing categories are exports of industrial consumer and military goods. According to Konstantinov, domestic prices on industrial consumption goods were kept in line with world prices.¹¹ The price index for exported military goods is apparently the same as that for civilian machinery. Consequently, the above table can be assumed to provide a general but full comparison of price trends. It is

interesting to observe that the two jumps in the world prices on industrial materials in 1973 and 1974 were followed by only one price increase in domestic prices in 1974. Similarly, three consecutive jumps in world prices on agricultural goods in 1972-1974 were followed by only two increases in contract prices in 1975 and 1976 and by the stabilization of domestic prices. Increases in world prices on machinery in 1974 and 1975 were followed by increases in contract and domestic prices in 1974 and by an increase in contract prices in 1975-1976.

A clear pattern emerges pointing to the CEMA price reforms of 1975 and to the rejection of these reforms by Soviet planners in setting domestic prices. The observed correlation between world and contract prices is strong but delayed. CEMA countries apparently make at least a partial effort to shield their domestic economies from the unpredictable fluctuation of the world markets. As Soviet authors emphasize, this practice assists planners in increasing efficient cooperation between CEMA countries, and at the same time it creates conditions whereby producers in CEMA countries develop better incentives for competing with developed capitalist countries for export markets.¹²

The noticeable jump of contract prices in 1975-1976 can be traced to the decision made by the 70th session of the CEMA Executive Committee that took place in 1975. It was decided that the fixed timetable for connecting current and previously existing world prices should become adjustable. Before that decision the contract prices for 1971-1975 were based on average world prices that existed in 1965-1969. This led to a gross discrepancy between contract and world prices by the end of each five-year period. Such a discrepancy reached particularly intolerable proportions in 1973-1974 when world prices began to rise rapidly as a result of the oil crisis and the devaluation of the dollar. According to Glushkov and Deryabin (1983), contract prices for 1979 were based on the average world prices that existed in 1974-1978, while contract prices for 1980 were based on the average world prices that existed in 1975-1979.¹³

The demonstrated correlations between world and contract prices and between the convertible and gold ruble point to the possibility that the official ruble-dollar exchange rates issued by the USSR State Bank may prove to be credible and provide some measure for comparing Soviet and Western economies. The perennial Western distrust of the official exchange rates may thus appear exaggerated. The problem, however, is that even if one disagrees with the Soviet method of fixing the exchange rate, which admittedly has never been fully explained in the officially published literature, no other viable methods have yet been proposed.

While export and import conversion coefficients measure the relative value of goods, they cannot be used to measure the ruble-dollar ratio. Domestic prices on exports and imports reflect particular foreign trade objectives which result in large budgetary subsidies on some goods and large budgetary revenues from sales of other goods.¹⁴ Furthermore, the ratio between revenues and subsidies is much larger for imports than for exports. In fact, the production of many capital goods for export is subsidized. The same holds for domestic purchases of imported capital goods.

The result of this heavy budgetary intervention is that Soviet consumers and the armament sector largely finance foreign trade, particularly purchases of expensive agricultural goods and machinery from the West and sales of raw materials to Soviet allies at deflated prices. The Ekonomicheskaya Gazeta reported in 1981 that Poland alone saved 5.8 billion rubles during 1976-1980 by buying cheap Soviet oil and gas.¹⁶ This practice was recently discontinued, however, with the sharp increase of domestic and contract prices on Soviet oil and gas. Budgetary control over foreign trade activities combined with the considerable functional differences between Soviet exports and imports thus undermines the argument that export and import conversion coefficient better measure the relative purchasing power of the ruble than the official ruble-dollar ratio.

The Soviet price system generally includes three types of export prices: regular wholesale prices on exports produced according to technical standards accepted for domestic purposes, regular prices on goods produced according to the same standards but with additional requirements for foreign buyers, and special wholesale prices on exports produced for one-time purposes.¹⁶ Except for the first type of prices, all of these export prices presuppose a much higher production cost than domestic prices. The reason for this is not only that the quality of domestic goods is much lower than that of export goods but also that domestic producers must meet the special demands of foreign buyers. The additional cost of meeting these demands is often subsidized by the state budget. Incidentally, the same price system is established for import goods, except that all export prices exclude the turnover tax, while most prices on imported consumer goods include this tax.

The Soviet export-import price policy is based on the principle of maximizing net revenues from foreign trade. The implementation of this traditional policy has resulted in the explosive growth of budgetary revenues from foreign trade during the second part of the 1970s and early 1980s. Some Soviet authors argue, however, that this policy leads to the poor competing ability of the Soviet manufacturing sector in world markets and thus to the high potential cost of both exports and imports.¹⁷ Instead, these authors propose remedies reminiscent of those that made export sectors of some East European countries more competitive, namely the increase of export prices. These authors refuse to admit that such remedies would cause an immediate decline in net budgetary revenues, something that Soviet planners cannot afford concurrently with the military drive and the expensive food program.

8.2 THE COMPILATION OF FOREIGN TRADE INDICATORS

Soviet planners have developed a system of compiling foreign trade indicators that is peculiar to the command economy and thus may appear confusing to those researchers who study market economies where domestic currency is freely exchanged for foreign currency. In command economies, profitable foreign trade results not only in the growing foreign currency reserves but also in the growth of net budgetary revenues. Total revenues from foreign trade in command economies thus exceed those in market economies by the amount of net budgetary revenues from foreign trade. There are also differences with respect to the flow of goods. In market economies exports increase the value of total output, while imports decrease it. In national accounts of command economies, traded goods are

registered only in domestic prices, whereby the inflow of traded goods (import) is perceived as additional resources available for end use and the outflow of traded goods (export) is perceived as the loss for domestic producers and consumers.¹⁸ When planners are interested primarily in the production capability of the domestic economy they approach export as part of the total end product in the same way as Western economists.¹⁹

Given planners' treatment of foreign trade activities, it becomes clear why three sets of foreign trade indicators are compiled for NEB, input-output and financial accounts. All these sets of indicators are based on the idea that revenues from foreign trade are earned by the entire economy rather than by foreign trade organizations. As noted in the Gosplan manual, the foreign trade surcharge is added to that of domestic trade organizations to determine the total trade surcharge, which equals the trade GVO.²⁰ It is essential, therefore, not to confuse the net profit earned by foreign trade organizations with imports and exports, which constitute net revenues of the entire economy.

The NEB method is based on treating foreign trade as a source of two additional resources to the domestic economy: the inflow of goods and foreign currency revenues. The total for these resources equals net imports plus net additions to foreign currency reserves, both estimated in domestic rubles.²¹ Net imports equal the balance between imports and exports in domestic rubles. Additions to foreign currency reserves in gold rubles equal the difference between export and import. These reserves are converted from gold to domestic rubles using the conversion coefficient. When additions to reserves are positive, planners use the export conversion coefficient (the ratio between exports in domestic and gold rubles). When the result of foreign trade activities is the depletion of reserves, planners use the import conversion coefficient (the ratio between import in domestic and gold rubles).

Planners treat additions to foreign currency reserves as resources that are not used for acquiring additional goods. In contrast, they see the depletion of reserves as the use of resources generated during the preceding period for acquiring additional goods. To distinguish between the production and end use of resources, planners introduced two types of national income: produced national income (PNI) and national income available for end use (NI). Additions to foreign currency reserves are subtracted from the PNI to derive the NI, while the depletion of these reserves are added to the PNI to derive the NI.

In the input-output tables, the PNI excludes all foreign trade indicators.²² In effect, the coverage of foreign trade activities in the input-output table is confined to the second quadrant on final demand. While imported goods increase the intermediate product-consumption and investment-no trace of these additions to resources can be found in the published input-output table. Subtracting imports from exports in the second quadrant offsets these additions. The total end product includes exports but excludes imports.

The financial balance covers monetary flows connected with foreign trade and non-commodity transactions with the outside world. According to Galanov (1983), financial revenues include imports, exports and services that bring revenues to the state budget, while financial outlays include import and export subsidies.²³

If one assumes that the balance of credit payments with foreign governments approaches zero, then the balance of revenues and subsidies exceeds the NEB foreign trade balance by the amount of revenues generated in the service sector. To demonstrate his point, Galanov lists the following two equations:

$$R = I'd - I'g + E'g - E'd + K' \text{ (1) and } O = E''d - E''g + I''g - I''d + K'' \text{ (2)}$$

where $I'd - I'g$ equals the difference between import in domestic and gold rubles for goods and services that bring revenues, $E'g - E'd$ equals the difference between export in gold and domestic rubles for goods and services that bring revenues, K' -credit and interest payments issued to the USSR; $E''d - E''g$ and $I''g - I''d$ represent financial losses and K'' -credit and interest payments issued by the USSR. These equations have the following specifications: $I'd > I'g$, $E'g > E'd$, $E''d > E''g$, $I''g > I''d$, $Id = I'd + I''d$, $Ig = I'g + I''g + K''$, $Ed = E'd + E''d$, $Eg = E'g + E''g + K'$. The difference between equations (1) and (2) equals:

$$R - O = (Id - Ed) + (Eg + K') - (Ig + K'') \text{ (3)}$$

Since deposits and withdrawals of foreign currency are balanced out with respect to a domestic money supply, $E'g + K' = Ig + K''$ and $R - O = Id - Ed$.

As emphasized above, the central feature of the Soviet foreign trade is the state monopoly on all flows of goods, services and invisibles, including credits and monetary gold payments. This means that the All-Union Budgetary organizations and the State Bank supervise all financial transactions connected with foreign trade. These financial transactions are divided into four areas: import and export (re-export) of material goods and services connected with the delivery of these goods, non-production services and other profit-seeking services provided by foreign trade organizations, monetary gold sales, and credit payments. Additional expenses include membership dues to international organizations, such as the United Nations, and the cost of maintaining Soviet missions abroad.

Since planners maintain two separate financial systems--budgetary and credit--foreign financial transactions are processed through both of these systems. While budgetary organizations transfer unused revenues to banks, all existing evidence indicates that budgetary organizations receive no transfers from banks. This applies not only to domestic but also to foreign financial transactions. Budgetary organizations collect funds from foreign trade agencies when the latter receive net revenues from import-export activities and subsidize producers for manufacturing unprofitable goods for export or for purchasing expensive imported goods. Net revenues from foreign trade accrue when the value of imported goods in domestic prices exceeds the value of these goods in world prices and when the value of exported goods in world prices exceeds the value of these goods in domestic prices.

8.3 REVIEW OF SOVIET AND WESTERN ESTIMATES

As evident from the above discussion, there are three possible approaches to estimating exports and imports in domestic rubles that are based on reconstructing the NEB, input-output and financial tables. The advantage of combining all three approaches is that the existing dearth of data on the subject makes it practically impossible to obtain results with the required precision using only one approach. It will be further demonstrated below that the NEB approach is central for obtaining data on control totals for imports and exports, which are necessary for estimating values of particular traded goods.

There exist two estimates of Soviet foreign trade indicators in domestic rubles. One was proposed by Sverdlik, who is a Soviet economist, while the other was proposed by Trembl and Kostinsky, who are Western researchers. Both of these estimates are based primarily on the reconstructed input-output tables. Their preference was prompted by the fact that these tables provide the only readily available source of information on total exports and imports in domestic rubles.

TSU officials accompany detailed input-output tables with the aggregated NKH table on the end use of industrial and agricultural goods in percentage terms, where 100 percent stands for the total supply of these goods whose value is not reduced by the amount of subsidies. The value of imports can be estimated as the difference between the total supply and the sum of GVO, T&C and T&D charges. Since TSU officials provide a separate entry for exports, the latter are obtained with an insignificant margin of error after the NKH table is transformed from percentage to value terms.

The noted researchers relied on the same published input-output data to arrive at different estimates of total supply for 1972. Estimates of imported industrial and agricultural goods derived by Trembl and Kostinsky exceed those derived by Sverdlik by 1.4 (28.0-26.6) and 0.2 (3.2-3.0) billion rubles respectively.²⁴ The discrepancy between their estimates of industrial exports is small--0.1 (17.0-16.9) billion rubles. The balance between total imports and exports (including imports of other production goods, which were around 0.1 billion rubles) estimated by the above researchers equaled 13.6 and 12.0 billion rubles respectively.

Sverdlik made crude estimates of industrial imports based on outdated conversion coefficients. The results proposed by Trembl and Kostinsky for 1972 can be successfully tested, thus disproving Sverdlik's estimates. Total industrial imports are estimated as a residual after accounting for the industrial GVO in industry prices and T&C and T&D charges in the following way: $(28.1 = 549.8 - 473.5 - 48.2)$. Similarly, the analysis of the PNI presented in Section 5 indicates that total revenues from foreign trade, including the depletion of foreign currency reserves, equaled 12.2 billion rubles. Since this depletion amounted to 1.4 billion rubles, the balance of imports and exports included in the NI equaled 13.6 $[12.2 - (-1.4)]$ billion rubles. The depletion of reserves is estimated by multiplying the negative export in gold rubles and the import conversion coefficient in the following way: $-1.4 = (-0.6) \times 2.36$.

The results for 1972 proposed by Trembl and Kostinsky appear superior to those of Sverdlik also with respect to particular coefficients needed to convert

published data from gold to domestic rubles. The above Western researchers relied on a number of Soviet sources, particularly Turetsky (1969), in estimating an average export conversion coefficient for food industrial products that equals 4.0.²⁵ Similarly, these researchers successfully refuted Sverdlik's assumption that the export conversion coefficient for textile materials has remained at 1.0 since 1959. They provided strong evidence that the size of this coefficient was approximately 3.0.²⁶ They also succeeded in obtaining data on export conversion coefficients for all capital goods for 1972. At the same time, Sverdlik completely overlooked the export price reforms of the CEMA bloc in the mid-1970's. As a result, he grossly overestimated total exports for 1975. His idea that the conversion coefficients remains the same for all goods contradicts the fact that Soviet domestic price changes are not correlated with world prices.

The problem with estimates proposed by Trembl and Kostinsky is that they did not fully utilize the available data on changes of particular export conversion coefficients and that they made unjustified assumptions about changes of particular import conversion coefficients. The problem with their estimates for imports during the post-1972 period stems from their unwillingness to accept the national income data for deriving the control total for the foreign trade balance. It also stems from their reliance on faulty evidence provided by knowledgeable Soviet economists. While the latter have published data on total exports in domestic prices and on export price indexes, they have displayed no access to reliable sources of information on changes in domestic prices on imported goods during the 1970s. For example, similar to Sverdlik, Belkin and Geronimus (1978) much overestimated total import in domestic rubles for 1975 by relying on outdated conversion coefficients.²⁷

As Trembl and Kostinsky observed, their assumption about changes in the import conversion coefficient led to results that exceeded those using the national income data by as much as 18.6 billion rubles by the end of the 1970s. This discrepancy would be much larger if they accounted for the fact that total net revenues from foreign trade included in the PNI exceed the balance of imports and exports by additions to foreign currency reserves which reached 3.4 billion rubles in 1979. In addition, they overestimated the foreign trade PNI.²⁸ In sum, their assumptions resulted in the overestimation of total import by at least 23 billion rubles in 1979.

They erroneously attempted to explain the detected discrepancy between the two estimates of the balance between import and export in terms of the uncertainty surrounding the planners' accounting of monetary gold sales and foreign freight activities.²⁹ While it is true that "much more research is needed on this subject," Soviet authors have revealed enough evidence pointing to the exclusion of the above foreign transactions from the earnings of foreign trade that are included in the PNI. By definition, monetary gold sales are excluded from the official statistical coverage of Soviet trade activities which are limited to the commodity exchange.³⁰ In the same vein, import and export revenues are earned by the entire economy and thus exclude net profits earned by T&C and T&D sectors engaged in foreign transactions. These profits are aggregated together with net profits earned by T&C and T&D sectors serving the domestic economy.

8.4 ESTIMATION OF FOREIGN TRADE INDICATORS

8.4.1 Data Base in Gold Rubles

The NKh includes two major tables on foreign trade that contain data on the value of total exports and imports in gold rubles and on the structure of total exports and imports in percentage terms. As TSU officials obtain data on foreign trade from the USSR Ministry of Foreign Trade, it can be safely assumed that the NKh tables only deal with gold rubles. Sectors involved in foreign trade are classified in the NKh as machines and equipment, fuels (oil, gas, and hard fuel) and electrical power, ores and metal, chemicals, wood and pulp industry, food products, intermediate textile products and industrial consumption items. The NKh data on exports and imports contains the residuals. Hidden in these residuals are exports of armaments and imports of strategic materials. It is possible to establish defense goods by identifying most civilian goods which are placed in the residual for concealment purposes.

Excluded from the NKh list of civilian goods are construction materials, goods of other production sectors, and precious metals and stones. The value of construction materials and goods of other production sectors can be determined from the publication of the USSR Ministry of Foreign Trade, Vneshnyaya Torgovlya SSR (VT), which provides a detailed account of almost all civilian goods. Goods of other production sectors consist of printed matter, films, records, etc., and the value of Soviet ship repairs in foreign ports which are treated as an import. The value of exported precious metals and stones is quite small (below 0.3-0.4 billion rubles) and thus has little effect on the size of the export coefficient for ores and metals.³¹ The value of other omitted civilian goods is below 0.1 billion rubles. The value of exported and imported military goods in gold rubles can be estimated as a residual with an insignificant margin of error.

The officially reported classification of exports and imports must be regrouped so that it will conform to principles followed by planners in their compilation of the NEB. The regrouping procedure entails the following steps: 1) food products are divided into agricultural raw materials, fruits and vegetables, sugar, meats and other food industrial products; 2) the total for industrial consumer goods are divided into particular sectors of production (exports include primarily MBMW products, while imports include soap and cosmetics, MBMW products, furniture, chemicals, and other industries); 3) strategic materials (import residual) are added to the metallurgy sector, and armaments (export residual) are added to the MBMW sector; 4) totals for fuels and power sectors are disaggregated; 5) totals for each sector are derived aggregating sub-totals. The above procedure is followed for estimating totals for each sector in both gold and domestic rubles.

8.4.2 Estimates in Domestic Rubles

This study deals with both aggregate and detailed estimates of foreign trade indicators in domestic rubles. Aggregate estimates concern the balance between imports and exports as well as total conversion coefficients. Detailed estimates contain totals for particular production sectors. The proposed

deciphering of the TSU code in the area of foreign trade is based on combining aggregate and detailed estimates.

Aggregates. As noted above, the balance between imports and exports plus additions to foreign currency reserves equals total earnings of the foreign trade that are included in the GSP and PNI. These total earnings were estimated in Section 3 as a residual after accounting for the output of the T&D and other production sectors. During the observed period, the depletion of foreign currency reserves took place in 1972 and 1975-1976. For all other years planners used the export conversion coefficient to determine additions to foreign currency reserves in domestic rubles.

If it is possible to determine total exports in domestic rubles using detailed estimates, then total imports in domestic rubles are possible to derive for all years, except for 1975 and 1976, as the sum of the foreign trade PNI and exports reduced by additions to foreign currency reserves. The same approach is not applicable to 1975 and 1976 because independent estimates are needed to determine the depletion of foreign currency reserves for these years. Fortunately, the depletion of reserves in gold rubles was only 0.7 billion rubles in 1976, indicating that reserves in domestic rubles could not exceed 1.5 billion rubles. After plugging this number into the above equation for total imports one discovers, however, that the import conversion coefficient equaled around 1.7 in 1976, the same amount as in 1977. Reserves were thus depleted by 1.2 rather than 1.5 billion rubles. The same procedure can be repeated for 1975 to arrive at the same coefficient 1.7. Similarly, the import conversion coefficient remained on the same level, 1.65, in 1978-1980. In 1982-1983, it jumped back to the 1975-1977 level. The most dramatic changes occurred in 1973-1974 and 1974-1975 when the coefficient decreased by 30 percent per year from 2.30 to 2.0 and then to 1.7. These drops have eluded the attention of both Soviet and Western economists because they have not considered the national income data as the control total for estimating imports in domestic rubles.

Exports. As estimated by Treml and Kostinsky (1982), export conversion coefficients were as follows in 1972: fuels--1.3; ores and metals--1.3; chemicals--2.0; wood materials--1.5; machines and equipment--0.92; agricultural raw materials--2.3; food products--4.0; and textiles--3.0.³³ The combined coefficient for consumer items produced in heavy industry apparently approached 0.95. The objective is first to derive the ratio between price indexes estimated in domestic and gold rubles for each category of exports, and then to obtain conversion coefficients for other years of the observed period.

Data on the structure of exports in constant gold rubles for 1975 and 1980, which was revealed by Sel'tsovsky (1983), is reproduced on the following page in Table 8-2.³⁴

**Table 8-2 THE STRUCTURE OF EXPORTS IN CURRENT
AND CONSTANT GOLD RUBLES**

	<u>1970</u>	<u>1975</u>			<u>1980</u>		
		Current	Constant	Index	Current	Constant	Index
Machines	21.5	18.7	24.7	1.25	15.8	26.3	1.60
Fuels and Power	15.6	31.4	17.6	2.93	46.9	18.4	6.81
Ores and Metals	19.6	14.3	15.9	1.45	8.8	13.4	1.75
Chemicals	3.5	3.5	3.8	1.51	3.3	4.4	2.00
Wood and Paper	6.5	5.7	5.5	1.70	4.1	4.1	2.67
Textiles	3.4	2.9	3.5	1.36	1.9	3.0	1.69
Food and Crops	8.4	4.8	5.0	1.57	1.9	2.7	1.88
Consumer Items	2.7	3.1	4.2	1.21	2.5	4.0	1.67
Exports by Sector				1.64			2.67

The above table includes indexes which were derived for each sector by comparing the value of exports in current and constant prices.³⁵ The price index for total exports equaled 1.64 in 1975 and 2.67 in 1980. This index equals the ratio between total exports in current and constant prices--24.0:14.6 for 1975 and 49.6:18.6 for 1980.³⁶ Total exports in constant prices are estimated by combining the value of exports for 1970 and the VT data on the growth of exports in physical units.

The domestic price index is estimated here by combining data presented by Mitrofanova (1978) for the period ending in 1976, which was reproduced in Table 8-1, and data derived independently in this study. According to Mitrofanova, the index for exported industrial raw materials declined to 0.96 in 1975, the index for exported agricultural and food products increased to 1.11, and the index for exported machinery and equipment increased to 1.19. The index for export sectors manufacturing industrial raw materials and food products is similar to the general index for these sectors derived in Section 3. Consequently, Mitrofanova's data can be extended for these sectors for the post-1976 period. The export machinery index, however, exceeds the general MBMW index. It is assumed here that the trend in the ratio between import prices on MBMW products in domestic and gold rubles observed during 1970-1975 can be extrapolated with an insignificant margin of error for the 1976-1980 period. The domestic price index for consumer items is assumed to be the same as that for MBMW products.

Export conversion coefficients then changed in the following way between 1975 and 1980: fuels--0.6 to 0.4; ores and metals--1.0 to 0.7; chemicals--1.5 to 0.8; wood and paper--1.5 to 1.1; textiles--2.6 to 2.0; and machines and equipment--0.90 to 0.75. The derivation of coefficients for 1971-1976 and 1977 is based on data

presented by Glushkov and Deryabin (1983), which was reproduced in Table 8-1. These Soviet authors presented world and contract price indexes which need to be combined into one index for prices in gold rubles. Exports to CEMA countries account for 33 percent of fuels and other raw materials, 60 percent of machinery and equipment, 90 percent of food products, and 50 percent of textile products. These percentages serve as statistical weights in combining world and CEMA price indexes.

The derived export conversion coefficients first lead to exports of particular goods in domestic rubles and then to total exports in domestic rubles. The derived total exports are then successfully tested for 1970 and 1975-1977. According to Katushev (1972), Bautina (1972), and Alkhimov (1977), exports comprised 6.3 percent of the PNI in both 1970 and 1975, which amounted to 18.3 and 22.8 billion rubles respectively.³⁷ The same amounts were derived in this study. What confirms the results for 1975-1977 is that the import conversion coefficient remained unchanged during that period.

Data for 1978-1979 is first obtained by continuing the trend in the change of export conversion coefficients observed before 1978 and 1980. The preliminary results lead to the combined import conversion coefficient that approaches 1.65, the same coefficient derived for 1980. It thus appears that planners decided to keep the import conversion coefficient stable during 1978-1980 as during 1975-1977. This observation makes it possible to decrease the estimation error not only for total imports but also for total exports. The discrepancy between improved and initial estimates for total exports is then distributed between particular sectors in proportion to their size.

Exports for fuels and power in domestic rubles can be estimated independently using the NKh table on the balance of energy resources listed in units of output. One first obtains data on the value of domestic output in purchasers' prices and then the price per unit of output. Afterward, this price is multiplied by the amount of exported units of fuel and power to obtain the value of exports. The derived results diverge only by 0.2-0.3 billion rubles from those derived using the export conversion coefficient. This small discrepancy justifies the use of the above NKh table for deriving data on fuels and power for the post-1980 period during which exports of fuels and power comprised 30 percent of total exports in domestic rubles. The domestic price of exported fuels increased dramatically as a result of the 1982 price reform.

During the post-1980 period, exports of machinery and armaments also comprised 30 percent of total exports. It is estimated that the export conversion coefficient dropped to 0.70 for these products by 1981, but returned to the 1978 level of 0.80 in 1982. This assumption is based on continuing the trend in the correlation between the MBMW domestic price index and changes in the conversion coefficient. The same procedure is repeated for other exports for the post-1980 period. While further research is needed to determine the total estimation error for each category of exports, a superficial analysis already indicates that the maximum error of 3 percent in selecting the conversion coefficient for that period results in decrease or increase of 0.6 billion rubles for all MBMW products. In all likelihood, the total margin of error is around 0.3-0.4 billion rubles for exports of MBMW products and 0.6-0.8 billion rubles for total Soviet exports in domestic

rubles for the post-1980 period. The same error is also accepted for total imports since the latter are derived on the basis of exports.

Imports. The derived total for imports in domestic prices serves as the control total for estimating the value of imports in particular sectors. Using input-output data published by Savinskiy (1978), Treml and Kostinsky estimated the following import conversion coefficient for 1972: metallurgy--1.0; MBMW products--0.98; wood products--2.8; construction materials--3.2; and textiles and apparel--5.4.³⁸ The above authors relied on other Soviet sources for estimating coefficients for fuels--1.8; flour and cereals--6.6; sugar--2.3; meats--2.0; sewn goods--4.6; textiles (cotton--3.4, silk--4.1, wool--7.6); hosiery and knitwear--8.3; leather footwear--5.3; most other light industrial goods, and animal husbandry -- 4.3.³⁹

The above authors proposed to estimate coefficients for the remaining sectors using the 1972 input-output data on total imports for heavy and light and food industrial groups, agriculture and other sectors of material production. Estimated as residuals, cumulative imports of chemicals and consumer items produced in the MBMW and other heavy industrial products equaled 3.7 billion rubles with the implied coefficient of 3.1. The above authors arbitrarily assumed that the coefficient for these products equaled 3.0, 2.0 and 4.7 respectively, implying a dubious overpricing of imports on one group of consumer items compared to the other group. Instead, it is assumed in this study that the conversion coefficient is approximately the same for the above two groups of consumer goods and this coefficient is smaller than in the apparel industry but larger than in the food industry; it thus equaled 4.0. The margin of error is quite insignificant due to the small quantity of these imported consumer goods.

Cumulative imports of food industrial products equaled 4.3 billion rubles with the implied coefficient of 3.3, and cumulative imports of crops equaled 2.5 billion rubles with the implied coefficient of 2.1. Imports of food industrial products without sugar, flour and cereals equaled 3.4 and 1.0 billion rubles in domestic and gold rubles respectively with the implied coefficient of 3.4. The coefficient for imported grain equaled 2.2; it can be estimated by comparing the value of one metric ton in both gold and domestic prices for the period ending in 1975, the year after which Soviet officials ceased the publication of data on imported grain in metric tons. In 1972, imports of all grains equaled 1.9 billion rubles, while those of fresh fruits, vegetables and nuts were 0.6 billion rubles with the implied coefficient of 3.0.

The analysis of how the above import conversion coefficients changed during the observed period is much complicated by the planners' policy of concealing data on changes in domestic prices on imports. What makes the completion of this analysis possible is another planners' policy of increasing prices on imported consumer goods to compensate for the loss of revenues caused by increases in world and CEMA prices. As the available evidence indicates, the import conversion coefficient for consumer goods remained practically the same during the observed period. At the same time, one can observe the decline of the cumulative coefficient for light and food industrial groups during some years that is caused by sharp increases in imports of sewn goods, sugar, and meats during 1973-1975 and during the late 1970s and early 1980s. Overall, the share of consumer goods and textiles in total imports, estimated in domestic prices still

increased from around 50 to 60 percent during the observed period. This can be explained by the fact that the conversion coefficients for producer goods decreased much more significantly than for consumer goods.

Total imports of producers goods (without textiles) are estimated here as a residual. The value of imported crops in domestic prices is estimated for the period ending in 1975 using the above mentioned approach. The results indicate that the conversion coefficient for imported crops declined slowly during the first half of the 1970s, reaching 2.0 in 1975. This can be explained by the existence of noticeable inflation in the domestic agricultural sector, which justifies the extrapolation of the established trend for the 1975-1981 period. The sharp increase of agricultural procurement prices in 1982 is assumed here to cause the increase of the conversion coefficient to its early 1970s level of 2.2. The derived data on crops in turn leads to the control total for machinery and industrial intermediate products and to their cumulative conversion coefficient. The latter appears to change in the same way as combined domestic price indexes for these products, which decreased significantly during 1973-1977, stabilized during 1978-1980, and increased significantly in 1982. This correlation of indexes, combined with the stability of import conversion coefficients after 1975 and the predominant place of machinery in total imports of industrial producer goods, considerably limit the estimation error.

In an attempt to refine estimates for changes in import conversion coefficients for heavy industrial products, this author compared price indexes compiled in gold and domestic rubles. The estimation of imports in constant gold rubles is based provided by Sel'tsovskiy (1983), which is reproduced in Table 8-3 below.⁴⁰

**Table 8-3 THE STRUCTURE OF IMPORTS IN CURRENT
AND CONSTANT GOLD RUBLES**

	<u>1970</u>	<u>1975</u>			<u>1980</u>		
		Current	Constant	Index	Current	Constant	Index
Machines	35.6	33.9	36.6	1.42	33.9	37.2	1.76
Fuels and Power	2.0	3.9	2.0	2.98	3.0	1.0	5.79
Ores and Metals	9.6	11.6	10.3	1.72	10.8	10.8	1.93
Chemicals	5.7	4.7	5.0	1.44	5.3	5.4	1.90
Wood and Paper	2.1	2.2	1.7	1.98	2.0	1.8	2.14
Textiles	4.8	2.4	2.3	1.60	2.2	1.9	2.23
Food and Crops	15.8	23.0	18.8	1.87	24.2	20.9	2.23
Consumer Items	18.3	12.9	15.7	1.26	12.1	15.3	1.53
Imports by Sector				1.53			1.93

The above table includes price indexes for particular imports which were derived in the same way as those for exported goods. As evident from this table, MBMW products and metals comprise most imports of heavy industrial capital. The comparison of price indexes compiled in domestic and gold rubles leads to the following changes in import conversion coefficients between 1975 and 1980: fuel and power--1.0 to 0.6; ores and metals--0.6 to 0.5; chemicals--1.5 to 1.2; and wood and paper--1.6 to 1.4. No such comparison can be made for machinery imports whose domestic prices are much higher than domestic prices of MBMW products manufactured in the USSR. MBMW imports hence can be determined either as a residual or by assuming that the import and export price indexes compiled in domestic rubles remained the same until 1982. Both approaches lead to similar results.

Financial Transactions. Net financial revenues earned from foreign trade equal the difference between total revenues and subsidies. Total revenues in turn equal the sum of import and export revenues, revenues from sales of gold, revenues from tourism, transportation and other revenues. The latter are counterbalanced by Soviet support of personnel abroad and payments to international organizations. Revenues from tourism do not exceed 0.3-0.4 billion gold rubles a year.⁴¹ Soviet monetary gold sales were below 0.1 billion dollars before 1972, the year when Soviet trade representatives began to take advantage of skyrocketing prices at international gold markets. After that year, Soviet annual gold sales averaged 1.5 billion dollars, fluctuating between 0.8 billion in 1975 to 2.5 billion in 1978. In gold rubles, Soviet gold sales average 1.0 billion, fluctuating between 0.6 and 1.7 billion.⁴²

Soviet foreign financial transactions must be analyzed in both domestic and gold rubles for estimating total foreign currency reserves as well as state budgetary flows connected with foreign transactions. Since gold rubles have no circulation in the domestic economy, state budgetary flows exclude foreign currency flows. Consequently, it appears unnecessary to convert revenues of the service sector and monetary gold sales from gold to domestic rubles. For the purposes of estimating the Soviet GNP in Western terms it is necessary, however, to increase net exports by all revenues from non-commodity foreign transactions. In this case, one can follow Soviet planners' method of relying on export or import conversion coefficient.

An attempt is made in Section 6 to use official budgetary accounts to estimate total foreign trade subsidies with an insignificant margin of error. Foreign trade revenues are then estimated as the balance of imports and exports plus subsidies. Export subsidies equal the difference between exports in domestic and gold rubles, while import subsidies equal the difference between imports in gold and domestic rubles. In both cases, subsidies are administered with respect to those goods for which the above differences are positive. The existing data base makes it impossible to establish the list of these goods with the required precision. The same applies to those goods that generate revenues. Export and import conversion coefficients are poor indicators in this respect because they are estimated in purchasers' prices which are distorted through the state budgetary intervention. As a general rule, most consumer goods and textiles generate

revenues, while many imported machinery products and agricultural raw materials are subsidized.

8.4.3 Conclusion

The increasing importance of the foreign trade sector to the Soviet economy becomes evident after determining the ratios between the foreign trade balance and national income, and between total revenues from foreign trade and budgetary revenues. During the 1970s these ratios increased from 2.4 to 7 percent and from 10 to 18 percent respectively. Most of the growth took place during the second half of the 1970s. In contrast, foreign trade subsidies comprised around 5 percent of budgetary outlays throughout the observed period.

The estimated values of imports and exports in domestic rubles are crucial for completing the NEB in four respects. First, data on total imports for each production sector leads to total supply of particular goods. Second, data on total exports by sector is needed for estimating the end use of particular goods. Third, data on foreign trade revenues and outlays makes it possible to estimate total state budgetary deficits. And fourth, data on conversion coefficients is useful for international comparison purposes as well as for studying the price mechanism by which planners channel financial resources from the household to defense sector.

END NOTES

¹ Among numerous studies on Soviet foreign trade activities, only the two cited studies deal with the problem of converting Soviet exports and imports from gold to domestic rubles. This fact served as a reason for selecting these two studies for a critical evaluation.

² See Yu. Konstantinov, *Mezhdunarodnaya Valyutnaya Sistema Stran-Chlenov SEV*, (Moscow: Finansy i Statistika, 1982) particularly pp. 128-130.

³ Ibid, p. 42; also Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1980), p. 57.

⁴ Ibid., pp. 122-125.

⁵ Ibid., p. 126.

⁶ Cited in N. Glushkov, and A. Deryabin, eds., *Tsena v Khozyaistvennom Mekhanizme*, (Moscow: Nauka 1983), pp. 383-384.

⁷ See Konstantinov, p. 127.

⁸ Ibid., p. 125.

⁹ Cited in U.S. Department of Commerce, *Domestic Value of Soviet Foreign Trade: Exports and Imports in the 1972 Input-Output Table*, by V. Treml and B. Kostinsky, Foreign Economic Report, No. 20, (Washington, D.C., Government Printing Office, 1982). p. 22

¹⁰ See Glushkov and Deryabin, p. 378, and N. Mitrofanova, *Tseny v Mekhanizme Ekonomicheskogo Sotrudnichestva Stran-Chleno SEV*, (Moscow: Nauka, 1978), p. 80. Mitrofanova's figures are cited by Treml and Kostinsky, p. 70.

¹¹ Konstantinov, p.18.

¹² Glushkov and Deryabin, p.386.

¹³ Ibid., pp. 387-388.

¹⁴ This point is also emphasized by Konstantinov, pp. 49-50.

¹⁵ Ibid., p. 117. The issue is dated No. 52, 1981, p. 19.

¹⁶ Refer to Glushkov and Deryabin, pp. 376-377.

¹⁷ Ibid., p. 380.

¹⁸ Refer to A. Volkov, *Perspektivnoe Planirovanie Finansovykh Resursov*, (Moscow: Finansy, 1976), p. 95.

¹⁹ See Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), p. 633.

²⁰ According to Gosplan (1974), pp. 609-610, the GVO of the entire trade sector includes that of the foreign trade sector, while the foreign trade balance equals net revenues earned by the entire national economy.

²¹ For the most complete description of the NEB method refer to V. Belkin, and A. Geronimus, eds., *Model' Dokhod-Tovary i Balans Narodnogo Khozyaistva*, (Moscow: Nauka, 1978), pp. 204-219.

²² See Volkov (1976), pp. 96-97.

²³ V. Galanov, *Svodnyi Finansovyi Balans*, (Moscow: Finansy 1983),

²⁴ Sh. Sverdlik, *Obshchestvennyi Produkt i Denezhnyi Oborot*, (Novosibirsk: Nauka, 1981), pp.182-183, and V. Treml and B. Kostinsky, p. 56.

²⁵ Treml and Kostinsky, p. 47.

²⁶ Ibid., pp. 39, 45-46.

²⁷ Belkin and Geronimus, p.171.

²⁸ Treml and Kostinsky, p.66.

²⁹ Ibid, pp. 66-67.

³⁰ See CEMA Statistical Handbook 1984, pp. 437-438.

³¹ Estimated in Treml and Kostinsky, p.34.

³² It can be observed that the TSU secret code in the area of foreign trade is specifically designed to prevent researchers from estimating control totals for imports and exports. Otherwise, it is unclear why TSU officials keep so much secrecy about planned losses and the total value of resources.

³³ Treml and Kostinsky, pp.38-39.

³⁴ See V. Sel'tsovskiy, "Sovershenstvovanie Analiza Effektivnosti Vneshney Torgovli SSSR," *Vestnik Statistiki*, No. 6, (1983) , p. 45.

³⁵ The table indicates the dramatic effect of world prices on the earning power of Soviet exports. Increases in prices on oil compared to machinery products allowed Soviet export companies to earn three times more from sales of oil than from sales of machinery products.

³⁶ Further research is needed to determine the reliability of the reported growth rates for Soviet exports and imports. If the Vneshtorg data proves reliable, then it would be possible to study changes of Soviet domestic prices relative to that of export and import prices. This in turn would help to understand the relative value of the domestic ruble compared to foreign currencies.

³⁷ See K. Katushev, "Mirovaya Sistema Sotsializma: Glavnye Tendentsii Razvitiya," *Kommunist*, No. 5, 1972, p. 22, M. Bautina, "Ekonomicheskaya Integratsiya Stran-Chlenov Sev," *Ekonomika i Organizatsiya Promyshlennogo Proizvodstva*, No. 3., 1972, p. 29, and V. Alkhimov, "Problemy i Perspektivy Razvitiya Vneshey Torgovli SSSR," in *Vneshneekonomicheskie Svazi Sovetskogo Soyuz na Novom Etape*, eds. V. Brykin and V. Vagonov, (Moscow: Mezhdunarodiye Otnosheniya, 1977), p. 15. All these sources were originally cited in Treml and Kostinsky, p. 69.

³⁸ Ibid, pp. 54-55.

³⁹ The most useful source for learning about imports of apparel and other light industrial products is P. Lokshin, *Spros Proizvodstvo Torgovlya*, (Moscow: Ekonomika, 1975).

⁴⁰ Sel'tsovskiy, p. 45.

⁴¹ These are rough estimates based on the assumption that 5 million tourists spend on the average 500 dollars in the Soviet Union, while 4 million Soviet citizens spend on the average 250 rubles abroad and that transportation revenues do not exceed 0.3-0.4 billion dollars.

⁴² U.S. Central Intelligence Agency, *Handbook of Economic Statistics, 1983, A Reference Aid*, CPAS 83-100006, September 1983, p. 70.

PART V

**LABOR AND CAPITAL RESOURCES
AND PRODUCTIVITY**

9.0 LABOR RESOURCES AND PRODUCTIVITY

The following analysis of Soviet labor resources focuses on major demographic trends, civilian and defense labor force and its productivity. The primary objective of analyzing demographic trends is to establish the total size of the Soviet labor force. While a number of informative works on Soviet demographic trends has appeared in the West during the past decade, none of them has addressed the issue of defense labor. The reason for such a lack of focus can be traced to the traditional belief, which was never substantiated, that the defense industrial labor is included in the official labor statistics.¹ The following analysis constitutes the first attempt to challenge the traditional belief by ascertaining that the official labor force excludes the defense industrial labor.

9.1 DEMOGRAPHIC TRENDS

9.1.1 Basic Concepts

Age Groups. Planners divide the entire Soviet population into working and non-working age groups. The working age group includes males between the age 16 and 60 and females between the age of 16 and 55 as well as early retirees who receive their pension before the retirement age. The working age group is in turn divided into those persons who are able to work and permanently disabled. Total labor resources consist of the working age persons who are able to work as well as pensioners and young people under 16 who are part of the labor force.² Under the Soviet law, all persons in the working age group who are able to work must find employment. In effect, qualified persons who remain unemployed longer than prescribed by the law are felons and thus subject to criminal proceedings. The followings groups are exempt from the above law: mothers raising children, full-time students, and persons serving in the armed forces. Private agricultural activities are legal in the Soviet Union. Persons engaged in these activities are the only legally self-employed Soviet citizens.

Unemployed. Public sector's labor force includes all employees who receive wages, including prisoners. Persons taking vacations, on maternity leave, performing state duties (except service in the armed forces), taking admission examinations to schools of higher education, and on sick leave remain on the payroll. When the authors of the USSR Constitution proclaim the achievement of full employment they avoid mentioning a large group of part-time employees. Similar to other distortions of reality that can found in the Soviet literature, the unemployment problem is misleadingly referred to as "the leakage of cadres." Soviet economists are able to analyze unemployment and its causes under this ideologically safe disguise, thus avoiding the wrath of censors.

Planners' analysis usually focuses on a number of days lost per one employee during a year due to "the leakage of cadres". The calendar year consists of a certain number of working days which during the 1970s decreased from 270 to 260 in the state-cooperative sector and from 255 to 245 in the collective sector.³ The number of lost working days multiplied by the average annual amount of state-cooperative and collective labor equals the total amount of unemployment

days. The ratio between this and the amount of working days equals the unemployment rate.

Instruments with which Soviet officials compile census returns are not sensitive enough to help Soviet demographers to distinguish between full and part-time employees. Public sector's labor force cited in census returns thus exceeds the number of employees recorded in labor statistics not only by the number of persons working in the defense area but also by the number of unemployed, including unemployed prisoners. In effect, the derivation of data on unemployment in the USSR provides a key for obtaining information on the Soviet defense labor. This fact explains why Soviet officials are so reluctant to share information on the "leakage of cadres" with their academic colleagues, even though it constitutes one of the most quoted problems facing the Soviet economy during the 1980s.

Agriculture. The NKh and other official data on collective farmers is based on counting all individuals who participate in public works during the year, including full-time students, those collective farmers who found employment in the city, as well as persons from other organizations invited temporarily during the harvesting season. When TSU officials present public sector's total labor force they reduce the total for collective farmers by the number of those farmers who are full-time students and who found employment in the city, but fail to take any note of workers hired from the outside.

Their approach is quite justified because hired workers are either already registered as permanent employees of other organizations or are excluded from the labor force by definition if they are full-time students or in the military. While persons invited from outside are included in the total agricultural labor in the NKh table on agricultural cadres, they are excluded from the labor statistics altogether. It would be incorrect, however, to treat the above discrepancy as the testimony to the internal inconsistency of the official statistics. The NKh table on agricultural cadres serves the purpose of helping planners estimate the efficiency of the agricultural labor employed in public farms. In contrast, the purpose of the labor statistics is to help planners estimate the number of persons on payroll in each sector of the economy.

Whereas planners can disregard the productive contribution of full-time students, prisoners, and draftees who do not receive wages, they must account for employees of service sectors who participate in agricultural works as contributors to the GSP and national income. It is this author's belief, therefore, that planners add the above employees of service sectors to the total for productive labor, for the purpose of estimating labor productivity trends.

With regard to the private farm labor, planners themselves admit that their estimates are quite arbitrary. They claim that their estimates include only those self-employed farmers who are in the working age group and who are able to work. Thus excluded from the category of self-employed farmers are employees of the state sector, pensioners, and full-time students, even though these members of self-employed farmers' families produce the greater part of the total private agricultural output. According to the published census reports, the number of self-employed farmers decreased from 1.9 to 0.6 million between 1970 and 1979.⁴ However, in their estimation of the total agricultural labor that appears in the

noted NKh table, TSU officials arrive at results that defy all demographic trends--5.2 and 3.9 million persons. It appears that TSU officials consistently overestimate the number of self-employed by 3.3 million. Again, it would be incorrect to accuse TSU officials of purposefully creating inconsistencies in the official statistics.

According to Kuznetsova (1984), the officially reported number of self-employed has nothing to do with the actual number of man-hours spent by Soviet people in private agricultural activities.⁵ TSU officials first establish labor productivity in collective farms by measuring the output per one labor input and then divide the private agricultural output by the derived labor productivity in collective farms to determine the total number of self-employed farmers. Such an approach disregards divergent production conditions in the two agricultural sectors. The rejection of the TSU method calls for an alternative approach to the estimation of labor productivity in private agriculture based on the analysis of time spent by state-cooperative employees and collective farmers doing private agricultural works. This analysis is presented below in connection with the overall study of Soviet labor productivity trends.

Construction. Similar to the agricultural sector, the Soviet construction sector enjoys the considerable support of persons invited from the outside. Former inmates of forced labor camps report how millions of Soviet prisoners gave their life in building industrial facilities and railroads. The practice initiated under Stalin continues in the present time. The NKh for 1984 began to include data on student construction brigades and their annual output. Similar to student brigades, the military and prisoners who do not receive wages are excluded from the labor force by definition. This practice certainly results in the gross overestimation of productivity trends in the Soviet construction sector.

9.1.2 The Estimation Procedure

In order to preserve unity between labor and demographic statistics all demographic data are converted into the average annual format. The total for the non-working age group is estimated as the sum of children and young adults under 16 and pensioners. After that, the total for the working age group is estimated as a residual. In an attempt to simplify the estimation procedure, all pensioners--including disabled persons--will be registered here together with members of the non-working age group, while all dependent women are registered as pertaining to the working age group.

Under 16. Children and young adults under 16 include four groups: students, pre-school children who attend kindergartens and other public facilities, children who remain at home, and young adults who entered labor force. Data on students, pre-school children, and the total for new born infants are regularly reported in the NKh. The average number of students is estimated as the sum of two thirds of students attending school during the previous year and one third of students attending during the current year. According to estimates made by Soviet demographers, 30 percent of infants are born during September-December.⁶ Children are allowed to enter elementary school when they reach 7. In 1970, 70 percent of children born in 1963 and 30 percent of children born in 1962 entered elementary school. The total number of pre-school children is estimated as the sum

of the average annual number of infants born between 1963 and 1970 minus the average number of students attending the first grade in 1970. Children remaining at home are determined as the difference between all pre-school children and children attending kindergartens. Data reported in the TSU periodical makes it possible to estimate students of general and technical schools who are over 16.

As reported in Soviet sources, 70 percent of all children who entered the ninth grade in 1970 (around 4 million) and 90 percent in 1979 (around 4.4 million) eventually completed the tenth grade or its equivalent in technical schools.⁷ The number of working young adults thus decreased from 1.2 to 0.4 million during the 1970 (a decrease of approximately 0.1 million a year). The total number of children and young adults under 16 decreased from 67.0 to 63.1 million between 1970 and 1979.

Pensioners. The information on pensioners can be found in the NKh table on pension recipients which until 1975 included the following categories: the total number of recipients, recipients above a certain retirement age, persons on disability presented together with dependents who lost their provider and special pensioners, and the retired military who are called "veterans of war." In addition, the table includes collective farmers who receive their social security payments from a separate retirement fund. TSU officials decided to discontinue a separate coverage of the retired military after 1975. The combined number of disabled persons and military pensioners, however, has changed insignificantly since 1975. It appears that the number of veterans of the younger generation offsets the decline in the number of veterans of the older generation.

As reported in Soviet literature, the ratio between working pensioners and all retired civilian employees increased from 12.5 percent in 1965, to 14 percent in 1966, to 24.3 percent in 1975, and to 25.3 percent in 1979.⁸ In 1970, this ratio was apparently around 22.5 percent. The number of civilian employees above the retirement age who continued working increased from 5.5 (24.5*225) to 8.1 (32.0*253) million between 1970 and 1979. This number, however, excludes the retired military who continue working. The number of all recipients of military pensions decreased from 4.2 to 3.5 million during the 1970s. While it is known that many retired military find employment in the civilian sector, the precise ratio between working and non-working military pensioners has never been officially revealed.

According to census reports, non-working pensioners comprised 13.5 and 15.3 percent of the total Soviet population or 32.8 and 40.3 million, as of January 1970 and 1979. The number of working military pensioners then decreased from 2.5 (40.8-32.8-5.5) to 0 (48.4-40.3 8.1) million. This startling discovery indicates that official census reports of 1970 and 1979 are mutually exclusive. Given the fact that 1970 results were presented in detail in a separate TSU publication and that detailed 1979 results were made secret, one must assume that working military pensioners are hidden in the 1979 census together with non-working pensioners. In 1970, more than half of military pensioners (55 percent) continued working. In 1979, the number of working military pensioners thus equaled around 2.0 million, while the number of all non-working pensioners equaled 38.3 (40.3-2.0) million.

Age Groups The total Soviet population increased from 242.8 to 263.5 million during 1970-1979. Persons in the non-working age group and disabled increased from 107.8 to 111.4, and persons in the working-age group who are able to work increased from 135.0 to 152.1. The public sector's official labor force increased from 106.8 to 124.1 million, of which working young adults and pensioners comprised 9.2 and 10.6 million. The total official labor force of working age, including self-employed persons, then equaled 99.5 ($106.8 + 1.9 - 9.2$) in 1970 and 114.1 ($124.1 + 0.6 - 10.6$) million in 1979. The number of full-time high school and college students over 16 increased from 10.3 to 11.4 million. This number excludes those college students who combined higher education with full or part-time employment.

Other persons in the working age then equaled 25.2 ($135.0 - 99.5 - 10.3$) in 1970 and 27.4 ($152.1 - 114.1 - 10.6$) million in 1979. Other persons include dependent women, persons without any legal income who will be referred to as drifters, and the unaccounted persons--the unemployed, the military and prisoners. The unaccounted persons can be determined as a residual after accounting for dependent women. Judging from published census reports, drifters numbered 0.3 million throughout the 1970s. More than half of drifters are females.⁹

Dependent Women. Since Soviet officials consider the number of dependent women to be a state secret, the researcher has no other alternative but to design an independent estimation procedure. The NKh includes data on the entire female population, the number of female employees working in the state-cooperative sector, as well as the percentage of females in the total for collective farmers and college students. According to census reports, around 90 percent of all self-employed are women.¹⁰ TSU officials observe that the ratio between young boys and girls is 1.05:1.00.¹¹ This ratio is used here to obtain information on females of pre-school age and receiving general education. Data on the ratio between female and all non-working pensioners can be derived only for 1970.¹² It is assumed here that this ratio increased by 0.2 percent a year from 67.2 percent in 1970 to 69 percent in the early 1980s.¹³

As reported in the TSU periodical, the ratio between women employed in the state-cooperative and collective sectors and the total female population changed from 36.6 to 38.6 and from 7.2 to 5.9 percent between 1970 and 1975.¹⁴ The number of employed females that is not registered in the official statistics increased from 2.1 to 2.4 million for the state-cooperative sector and decreased from 0.9 to 0.8 million for the collective sector between 1970 and 1975. These unaccounted female employees include those working part-time in the civilian sector, full-time in the defense sector, and non-working prisoners. Estimated as a residual, the number of dependent women decreased from 12.6 to 10.3 million between 1970 and 1979, while unaccounted persons of both sexes, including unemployed, increased from 12.4 to 15.7 million or from 11.4 to 14 percent of the officially published labor force.

Unemployed Persons. Soviet authors claim that the number of dependent women reached its minimum possible point during the 1970s, implying that young people constitute the only additional pool of labor resources. Soviet authors never bother to ask why in the midst of severe shortages of labor resources of the early 1980s at least 15 percent of healthy citizens of working age fail to participate in

building the communist society. Certainly, no such question can be expected from any Soviet economist who would appear profoundly shocked upon discovering that so many employees find no place in the officially reported labor force.

According to Antosenkov and Kupriyanova (1977), Gosplan officials began to publicize data on the "leakage of cadres" in the early 1960s when the average industrial worker lost 22-23 working days due to the change of employment. In the early 1970s the amount of days declined to 20. Altogether, Gosplan officials estimated that industry and construction employees lost between 110 and 120 millions of men-days.¹⁵ It follows, therefore that the number of industrial and construction employees changing the place of work fluctuated between 5.5 and 6 million per annum or 13-14 percent of these sectors' work force. The average number of days needed to find work in the non-farm sector is around 30-32 days, which amount to around 12-13 percent of the total number of working days a year. If one assumes that the "leakage of cadres" has the same dimensions throughout the Soviet non-farm economy, then the rate of unemployment is under 1.8 percent for non-farm employees. During the 1970s the number of unemployed persons in the non-farm sector increased from 1.4 to 2.0 million.

The evidence provided by the above Soviet authors indicates that the number of lost days for women exceeds that for men by around 10 percent in industry and construction.¹⁶ In the farm sector women are known to be outside labor force far more frequently than men due to their more extensive involvement in private agricultural activities. The comparison of census and NKh data indicates that 0.8-0.9 million of female collective farmers are outside the labor force each year. It is assumed here that no more than 0.3-0.4 million of male collective farmers are unemployed part of the year. The total number of unemployed collective farmers decreased from 1.3 to 1.1 million during the 1970s. This presupposes the unemployment rate of 7-8 percent. It is arbitrarily assumed here that the unemployment rate in state farms is around 5 percent (0.5-0.6 million). The total number of unemployed persons then increased from 3.3 to 3.7 million between 1970 and 1979, which suggests the total unemployment rate of around 3 percent. It is interesting to observe that some emigre economists who used to analyze the problem of "leakage of cadres" while working in the Soviet Union also suggest the same rate.¹⁷

Prisoners. As reported in Shifrin (1980), there were around 2000 forced labor camps, 273 prisons, and 85 psychiatric prisons.¹⁸ All of Soviet penal institutions appear to have the average capacity of housing 2.5 million inmates.¹⁹ Given the possibility that some penal institutions eluded the attention of the above researchers and that known penal institutions are never filled to their maximum capacity, the total USSR prison population apparently never exceeded 2.5 million during the 1970s. Considering the the U.S. prison population is always under 1.0 million, the suggested number for the USSR prison population seems credible. Most inmates in both countries are males.

Many of the prisoners employed in mining and construction sectors receive wages. The planning policy is to include all wage earners in the labor force. Following this policy, one can conclude that some inmates in forced labor camps are registered in the official labor statistics. Indeed, according to the Soviet labor

code, prisoners are not exempt from performing their work duties. However, there is no data on working prisoners who receive wages.

Given the lack of data on the USSR prison population, it is possible to only approximate estimates that are based on two assumptions. First, the number of inmates gradually increased during the observed period reaching a peak in the late 1970s. Second, the percentage of inmates registered as part of the labor force is at least 30 percent. Although no direct evidence can be cited to support the above assumptions, it is a widespread belief among Soviet emigres that the number of prisoners outside the labor force is under 2 million. The assumption that this number began to decline by the beginning of the 1980s is based on the speculative observation that the greater employment of prisoners could have served as one of the last reserves of labor force in the time of severe shortages and slowing economic growth. While the margin of error in the area of 0.5 million is quite likely, the proposed estimates indicate the upper boundary of the USSR prison population remaining outside the labor force and thus help attain the major objective of the present discussion, i.e., the estimation of defense labor.

Defense Labor. Estimated as a residual, the total defense labor increased from 7.8 million in 1970 to 8.6 million in 1975, to 9.8 million in 1979, and 10.1 million in 1984. The USSR Armed Forces consist of three categories: professional military, draftees, and supporting civilian personnel. According to Western intelligence estimates, professional military number around 0.7-0.8 million.²⁰ Draftees can be estimated independently as the sum of 18 and 19 year-old men who are not full-time students. Draftees serve 3 years in some branches of the armed forces. It can be assumed that the number of draftees serving their third year approximately equals young men who were exempt from serving in the armed forces for medical reasons.

Around 1.9-2.3 million young men are eligible for military service each year. Of this amount, 0.5-0.6 million enter schools of special and higher education. Their service is postponed until they complete their college courses. College graduates, however, serve in the armed forces a much shorter period of time than draftees. Thus, it can be approximately estimated that the entire military personnel consist of 3.5-4.5 million men. More precise estimates proposed in this study are based on establishing the number of males who reach the age of 18 each year. Civilian supporting personnel consists of around 1.0-1.5 million men and women. Of this amount, no more than one third are KGB and Ministry of Internal Affairs (MVD) civilian employees, who are not in the strict sense are serving in the USSR Armed Forces and who are thus included in the officially reported data on employees of the administration sectors. The total for the USSR Armed Forces has fluctuated between 4.5 and 5.5 million during the observed period.²¹

All Western observers agree that the size of the Soviet military is under 6 million. The proposed approximate estimates of the unemployed and prisoners are also among the highest proposed in the Western literature. Other proposed estimates of Soviet demographic trends are based on published Soviet sources and appear quite precise. Nevertheless, after all known components of the Soviet population are subtracted from the total, one still arrives at the mysterious residual which increased from 2.8 in 1965 to 3.2 in 1970, to 3.7 in 1979 and to 4.7 million in 1984. It is this author's belief that the mysterious residual represents those state

employees whose military product is excluded from the GSP and national income. It is arbitrarily assumed that 75 percent of these employees represents the group that actually manufactures weapons, while the remaining 25 percent is involved in other defense production and service activities which are excluded from the GSP and national income.²²

9.2 OFFICIAL LABOR FORCE TRENDS

As discussed above, the official labor force consists of state-cooperative employees, collective farms, and self-employed persons. The objective of the following discussion is to divide the reported total for state-cooperative employees and collective farmers into productive and service sectors as well as to propose a procedure for determining the actual number of self-employed who contribute to the production of national income. The division of employees into productive and service sectors is necessary not only for establishing Soviet productivity trends but also for estimating the number of employees working in the productive T&C, agricultural and science sectors which are covered in the confusing way in the official statistical publications.

9.2.1 Official Data Base

TSU officials make a considerable effort to conceal the total for production labor. The TSU secret code in this area is based on concealing the number of employees in the productive T&C and collective sectors as well as on changing the methodology for estimating the number of employees working in various state sectors and self-employed without informing the NKh readers. In order to solve the TSU secret code the researcher must compare all NKh, CEMA and VS tables covering labor force trends, including : 1) aggregated production and service sectors in percentage terms; 2) state-cooperative employees; 3) agricultural cadres; 4) the industrial labor; and 5) the VS table on total public employees.

The first noted table is the only one in the entire official statistics containing data on T&C employees engaged in productive and service activities. The conversion from percentage terms to millions of persons can be based on the estimation of the total labor force which is listed in the official tables as 100 percent. The regularly listed data on the total for workers and service persons is presented in the same way in all Soviet publications. Data on collective farms varies depending on the selection of a particular NKh and VS table. For example, the number of collective farmers for 1975 is presented in the following way: the NKh table on agricultural cadres--15.4 million, the NKh table on collectives (without fishing collectives)--15.2 million, and the VS table on total employees--15.0 million. The note presented in the VS table indicates that it excludes 0.35 million of collective farmers who found employment in the state-cooperative sector. In 1984, NKh editions began to contain this VS table. The VS data then must be used to obtain the total official labor force. Fishing collectives probably account for the difference between 15.2 and 15.0 million.

The official statistics contain two sets of data on self-employed: demographic data (the actual number of persons who are exclusively engaged in private agricultural activities) and productivity data (the artificial number

independently estimated by TSU agricultural experts) that is used in all NKh tables on labor force. The first noted table contains the following entries: total productive labor, productive state-cooperative labor, productive labor in collective farms (both public and private sectors are aggregated together), family members of state-cooperative employees engaged in private agricultural activities), and total non-productive labor which in turn is divided in two groups of sectors. The major difficulty with using this table is that in 1974 and 1978 TSU officials radically changed their method of estimating self-employed family members. In fact, before the last change in 1978 this table was incongruent with respect to the NKh data on agricultural cadres. The comparison indicates that using this table before 1978 leads to the gross overestimation of self-employed family members. TSU officials themselves acknowledge this fact by retroactively changing the table for 1975 in NKh editions issued since 1978.

The extent to which TSU officials were engaged in the conscious act of deception, thereby making it impossible for NKh readers to estimate productive T&C labor, is difficult to determine. Since the change of 1978 restored the internal consistency of the official labor statistics, it seems appropriate to ignore the issue of deception and to change the pre-1978 data in accord with the correct methodology. The procedure for completing such a change is presented below.

On two occasions, in 1970 and 1976, TSU officials changed their classification of state-cooperative employees working in industry, agriculture, and science. In this case, however, it would be incorrect to update the NKh data retroactively since this would lead to discrepancies between labor and national income statistics. For example, in 1976 0.2 million employees previously classified in the science sector began to be registered in the agricultural sector. When planners estimated wages in these sectors during the pre-1976 period, they relied on the old methodology which thus formed the basis of all their estimates of national income for that period. Accepting the new methodology for the pre-1976 period thus would result in the underestimation of wages in the science sector and the overestimation of wages in the agricultural sector.

Most entries in the NKh table on state-cooperative employees are straightforward and the division into production and service sectors is unambiguous. The two exceptions are entries for agricultural and T&C employees. The entry for agriculture includes the total and sub-total for state farmers. As explained in the NKh for 1970, the difference includes employees providing various veterinarian and scientific services to the agricultural sector. What TSU officials omit is that this difference also contains the number of state employees temporarily hired by collective farms. In the late 1960s their number was under 0.2 million and apparently it grew insignificantly during the 1970s.²³ When planners estimate the total volume of scientific services they add wages of employees serving the agricultural sector to those of employees working in the science sector.

A separate procedure must be devised to disaggregate the NKh data on T&C sectors into productive and non-productive components. The division performed by CEMA officials concerns only T&C employees serving non-production organizations. According to the CEMA methodology, T&C services provided to households are treated as productive.²⁴ The CEMA table on production

and service employees hence can be used to determine the number of T&C employees serving non-production organizations.

The NKh table on agricultural cadres has four useful entries: the total for agricultural labor, the total for public sector, the total for collective farmers, and workers invited from outside. Combining this table with the NKh table on state-cooperative employees leads to the number of collective farmers engaged in agricultural works. The NKh table on productive and non-productive labor is useful for obtaining data on collective farmers working in production and service sectors. It is thus possible to determine the total number collective farmers engaged in industrial and construction works as a residual.

The NKh contains data on particular industrial sectors for the period ending in 1975. In order to obtain information for the post-1975 period one must use NKh tables on growth rates of output and productivity trends in industrial sectors. The difference between total and listed industries equals the number of employees working in the nonferrous metallurgy and other heavy production sectors.

9.2.2 The Estimation Procedure

The procedure proposed in this study is divided into the pre-and post-1975 period due to changes in the TSU method of estimating the number of self-employed. In 1975, TSU officials estimated that this number equaled 4.5 million. As listed in the NKh for 1975, family members of state-cooperative employees working in private agriculture comprised 1.9 percent of the total labor. In 1978, TSU officials retroactively changed this number to 1.3 percent. The percentage for all collective farmers was changed from 13.2 to 13.3 percent. According to the old methodology, the total labor force equaled 121.7 ($102.2 + 15.0 + 4.5$) million, while the number of collective farmers in production sectors was 16.0 million and family members equaled 2.3 million. The number of collective farmers in the private sector hence equaled 2.2 ($4.5 - 2.3$) million; and in the public production and service sectors equaled 13.8 ($16.0 - 2.2$) and 1.1 ($15.0 - 13.9$) million. The total for public agriculture was 23.5 million, including state farms--9.8, labor from outside--1.0, and collective farmers engaged in agricultural works (determined as a residual)--12.6 million. Collective farmers in industry and construction hence numbered 1.2 ($13.8 - 12.6$) million.

In 1976, TSU officials lowered their estimates of self-employed from 4.5 to 3.7 million. According to the new methodology introduced in 1978, the total labor force equaled 126.2 ($108.6 + 13.9 + 3.7$) million in 1978. Following the above procedure, it is estimated that collective farmers in service sectors numbered 1.2 million, and in industry and construction, 1.1 million. The same numbers remained throughout the post-1978 period.

If one continues the trend in the number of self-employed established after 1975, then it should have equaled between 3.7 and 4.0 million in 1975 rather than 4.5 million. TSU officials exempted themselves from reporting their new estimates of self-employed for previous years by not updating the published number of self-employed. In addition, they always report data on the total agricultural labor without a decimal point, thus making it impossible for

researchers to avoid the estimation error around 0.2-0.3 million without making some substantiated assumptions. One such assumption is based on the observation that the total number of collective farmers in services, industry and construction remained stable during the observed period. The number of collective farmers in each of these sectors then can be assumed to remain stable as well. Using this assumption and employing the new TSU methodology leads to 3.4 million for the number of self-employed for 1975. This result confirms the established trend. Consequently, TSU officials upgraded labor productivity in private agriculture by as much as 12.5 (1-3.94:4.5) percent. Changes in percentages made by TSU officials for 1975 are extrapolated for 1976 and 1977.

The number of T&C employees serving production sectors is estimated here as the difference between the total for production labor and the sum of employees working in all production sectors, except for T&C. In 1975, this number equaled 7.1 million. It increased by 0.1-0.2 million, reaching 8.5 million in 1984. The error of 0.1 million cannot be avoided due to the conversion from percentages to millions. Since the correction of the TSU data for the pre-1975 period expands the margin of error, it seems that the most efficient way to proceed is to continue the trend in the number of productive T&C employees established after 1975. The total number of T&C employees increased by 0.2-0.3 million annually, including 0.1-0.2 in production services. In 1970, this number equaled 9.3 million, including 6.3 and 3.0 million in production and service sectors. Soviet authors report the division for communication sectors. The division for transportation sectors is performed using the residual method.

In national income accounts, T&C services are divided into household services on the one hand and services financed by the public sector on the other. This division is performed here using the CEMA labor statistics. When CEMA officials present data on productive and service sectors for the USSR they ignore self-employed persons, place collective farmers engaged in industrial and construction works together with agricultural employees, and treat T&C employees serving households as being engaged in productive activities. These peculiarities in the CEMA method provide a necessary key for converting the CEMA labor statistics from percentages to millions. The results indicate that the number of T&C employees whose salary is financed by the public sectors increased from 0.5 to 0.6 million during the observed period.

In planning tables, the total number of collective farmers is divided into each production and service sector. First, the combined number of collective farmers engaged in industrial and construction works is determined as the difference between all productive labor in collective farms and the agricultural labor. Second, the number of collective farms providing services equals the difference between all collective farms and those engaged in productive activities. According to Tikhonov (1981), the number of agricultural collective farmers engaged in industrial works equaled 0.5 million in 1975. Combined with fishing collectives, this number equaled 0.7 million.²⁵ Determined as a residual the number of collective farmers engaged in construction works equaled 0.5 million. Since the combined number of industrial and construction workers remained stable, data for 1975 can be extrapolated for other years with the margin of error around 0.1 million. Tikhonov also provided information on farmers engaged in education, health and everyday-communal services, whose number respectively comprised 65,

25 and 10 percent of the total number of employees servicing households in the countryside during the 1970s.²⁶ These percentages are approximately the same in the entire farm sector. Data on collective farmers providing various services is used here for the estimation of the total wage fund in each service sector.

9.3 LABOR PRODUCTIVITY TRENDS

Economists usually analyze labor productivity trends in terms of annual changes in net output per one unit of labor inputs. Three factors thus influence these trends--the level of net output, price changes and the size of the labor force--each requiring the compilation of a separate data base. The compilation procedure entails the selection and estimation of appropriate indicators that may vary depending on peculiarities of a given set of national accounts. In the Soviet case, economists must deal with indicators compiled for civilian production, service and defense sectors. The Soviet net material product referred to here as the produced national income (PNI) is generated only by civilian production employees. In order to analyze Soviet productivity trends in Western terms, one must convert the PNI into Western-type GNP as well as add service and defense labor to the civilian production labor force.

9.3.1 The Soviet Approach

The official statistics include data on the PNI in both current and constant prices as well as data on state-cooperative, collective and private labor. Most Soviet economists make crude estimates of Soviet labor productivity trends using the ratio between the PNI in constant prices and the total productive labor force. Their estimates would be credible if they would make an effort to substantiate their figures for the total productive labor force. In reality, most Soviet economists lack either time or knowledge to differentiate between productive and service employees of the T&C and collective sectors as well as to challenge TSU estimates of self-employed. In addition, it remains debatable as to whether the PNI constitutes the best indicator for measuring the productive capacity of the domestic economy because of differences in the price structure of imports and exports.

An attempt was made previously in this section to estimate the total for civilian production labor the way it is recorded by TSU officials. As was discussed above, TSU's own estimates of the private agricultural labor are open to criticism. Specifically, TSU estimates are based on the unjustified assumption that labor productivity in collective and private agricultural sector is approximately the same. The artificiality of this assumption is most evident in the TSU revisions of their estimates. While Soviet agricultural experts have openly criticized this assumption, they have failed to offer alternative estimates.²⁷

9.3.2 Estimation of the Self-Employed

The procedure proposed in this study is based on the results of the TSU survey of time spent by 51.6 thousand families between public employment, housing chores, engagement in private agriculture, recreation activities, etc.²⁸ These results lead to actual men-hours spent by workers and service persons and

collective farmers engaged in private agricultural work as opposed to men-hours spent at public enterprises. As discussed above, the number of persons engaged only in private agricultural activities dropped from 2.0 to 0.6 million during the past fifteen years. In contrast, the output of the private agricultural sector has steadily comprised one third of the total Soviet agricultural output. This discrepancy can be explained by the participation of family members, who are regular public employees, in private agriculture.

The published results of the noted surveys indicate that workers and service persons on the average spend 3 and 8 minutes a day during working week and weekends respectively doing private agricultural work. The figures for collective farmers are 1 hour and 17 minutes and 1 hour and 51 minutes respectively. Workers and service persons spend 7 hours and 53 minutes at public enterprises, while collective farmers spend 7 hours and 37 minutes. This means that workers and service persons spend 1.6 percent of their public working time in private agriculture, while collective farmers spend 27.8 percent. In 1979, total public employment in civilian and defense sectors (excluding draftees) was around 128.5 million, including 115 million in the state-cooperative sector and 13.5 million in the collective sector. It thus follows that 2.1 (128.5×0.016) million state-cooperative employees and 3.7 (13.5×0.278) million collective farmers worked in private agriculture in 1979. The total for private agricultural labor equaled 6.4 ($0.6 + 2.1 + 3.7$) million, which exceeds the official TSU figure by 2.5 ($6.4 - 3.9$) million. The same procedure can be repeated for other years of the observed period.

Since TSU officials underestimate private agricultural labor, they overestimate labor productivity for the entire agricultural sector. The same applies to the construction and other private production sectors. While TSU officials include the net output of these private producers in the PNI, they fail to account for these producers' working time. The output of collective and private construction sectors is approximately the same in size. Given the fact that collective construction is somewhat more productive than private construction, the number of private builders must be at least 0.8 million persons. It is assumed here that the number of persons engaged in other private production activities is also proportional to their output--around 0.3 million. As listed in the NKh for 1984, student production brigades number 0.7 million. Consequently, TSU officials underestimate the total productive labor force by around 4.5 million or 4 percent. This conclusion does not even take into account the productive contribution of draftees and prisoners working for free and millions of volunteers engaged in urban development on "communist Saturdays." In a strict economic sense, all productive men-hours must be accounted for and not only those that are compensated with wages or private acquisition of material wealth.

9.3.3 Estimation of Net Output in Constant Prices

Three types of net material output are examined in this study: the standard PNI, national income available for end use (NI), and the net domestic product (NDP). The PNI equals the sum of net products generated by material production sectors and foreign trade revenues. The NI equals the sum of consumption and investment; it is smaller than the PNI by the sum of planned losses and surplus foreign currency reserves. The NDP is smaller than the PNI by the amount of foreign trade revenues.

The idea behind using three rather than one universal measurement of the net product is that no single measurement is adequate for analyzing all aspects of annual economic activities. The PNI is an aggregate measurement of the ability of the civilian production sector to generate material wealth that is potentially available for end use. The NI is an aggregate measurement of material wealth that is actually available for end use. The NDP, which seems to be the most precise indicator for measuring labor productivity, registers the actual production capability of the domestic economy. The NDP is preferable to both the PNI and NI because it excludes import revenues whose growth cannot be attributed to the production capability of the domestic economy.

Even though both the NI and NDP may be better indicators than the PNI for measuring Soviet labor productivity trends, these indicators cannot be used with the same precision as the PNI. The reason for this is the absence of annual data on price indexes for consumption and investment funds of national income and for foreign trade revenues in domestic rubles. Soviet officials only publish the NI in constant prices for five-year periods and growth rates for foreign trade in physical terms. It would be a mistake, however, to apply the PNI index for deriving the NI and NDP in constant prices because of significant structural differences between these three types of the net output.

The PNI is a combined index of net outputs of particular production sectors and foreign trade revenues. The latter has an ever-increasing affect on the PNI index. Since the import price index exceeds the PNI index, the NDP index must be smaller than the PNI index. The growth of foreign trade activities during the 1970s and 1980s has widened the gap between these two indexes. The widening gap has also developed between the PNI and NI. For example, the difference between the PNI in constant and current prices decreased from 9.4 to 9.0 billion rubles between 1966-1970 and 1971-1975. In contrast, the difference between the NI in constant and current prices increased from 41 to 93 billion rubles during the same decade.²⁹

As Soviet authors observe, the widening gap between the PNI and NI indexes is the result of incongruities in planners' methods of estimating the PNI and NI in constant prices.³⁰ The PNI is derived as the difference between the gross output and the sum of material and depreciation outlays, all of which are estimated in constant prices using the structure of production established during the base year. Planners thus eliminate any effect of changes in the structure of production on the PNI index. In this regard, the PNI index distorts changes in actual prices, whereby the distortion becomes more noticeable with time.

In contrast, the NI index is based on actual price fluctuations with changes in the structure of consumption and investment funds taken into account. The paradox of the official Soviet statistics, however, is that the NI index distorts changes in the real value of goods and services to a much greater degree than the PNI index because of the pricing policy geared toward concealing inflationary tendencies in the Soviet economy. This paradox can be explained by the fact that the PNI index is less affected by price changes, which usually distort the real value of goods and services, than the NI index.

The data base prepared in this study is sufficient for estimating the NDP and NI indexes by following the above planning methods. The advantage of following these methods is that it leads to productivity trends not only for the entire economy but also for particular production sectors. An attempt is made in Section 3 to compile price indexes for the gross output of industrial, agricultural, construction, T&C and T&D sectors in producers prices. The price index for other production sectors is assumed to be the same as for the GSP index. Data on material and depreciation outlays in current prices is compiled in Section 4. The above indexes then can be used to convert this data into constant prices.

The structure of material outlays established during the base year is assumed to remain the same for other years in accord with the planning method. In 1982, the NKh began to include a table on material outlays of industrial sectors in constant prices for 1975 and 1980-1982. This data is used to test independent estimates for the above years. Afterward, the PNI in constant prices is determined for each production sector as the difference between the gross output and the sum of material and depreciation outlays--all estimated in constant prices. The results for the foreign trade revenues are obtained in the end as a residual.

The NI includes goods in purchasers' prices and the difference between imports and exports. The difference between purchasers' and producers' prices equals the sum of the turnover tax and the T&C and T&D charge. The NI in constant prices can be estimated by combining indexes for goods in producers prices, the turnover tax, T&C and T&D services and the above derived foreign trade revenues. Data on indexes for producers' prices and these services is taken from Section 3. The turnover tax in constant prices can be estimated only approximately by comparing two official industrial price indexes compiled with and without the turnover tax. These indexes are compiled with the outdated base year of 1949 and thus are intentionally designed to distort price changes that have taken place since the 1960s. It can be observed, however, that the distortion caused by the outdated base year is eliminated in the process of estimating the turnover tax as the difference between two official indexes.

The initial estimates of NI in constant prices are first obtained for each year of the observed period and then for Five-Year planning periods. The initial estimates are compared with the NKh data published for Five-Year periods. The detected estimation error is cumulative; it is distributed for given years proportionally to the size of the NI to arrive at final estimates. The results presented below indicate that the proposed approximate procedure leads to the initial error of only 2 percent for Five-Year periods. This suggests that the final error for each given year is quite insignificant.

9.3.4 Division of the Turnover Tax Into Industry and Agriculture

The NKh table on the PNI sector published before 1979 includes a note in which TSU officials acknowledge that they distort the industrial and agricultural PNI by including the entire turnover tax in the industrial PNI. In reality, the turnover tax constitutes revenues earned not only in industry but also in agriculture. Soviet agricultural experts have complained for years how the lack of data on the turnover tax that is part of the agricultural PNI makes it impossible for them to analyze labor productivity trends.³¹ In response to the above

complaints, in 1980 TSU officials began to publish the real agricultural PNI. During that year the difference between the real and underestimated value of the agricultural PNI equaled 59 (128-69) billion rubles or 40 percent of the real value. This difference reached 65.6 and 64 billion rubles in 1981-1982 but then declined sharply to 41 billion rubles in 1983.

A close look at the above TSU estimates indicates, however, that TSU officials failed to fulfill expectations of Soviet agricultural experts by carrying arguments proposed by these experts to the absurd end. Rather than dividing the turnover tax between industrial and agricultural sectors, TSU officials decided to determine the entire excessive revenues of non-industrial sectors using wages earned in each sector of the agricultural complex as a standard of measurement. As a result, TSU officials estimated their version of what the real agricultural PNI should be in the ideal conditions when prices would approximate real values of goods.

The TSU estimation method is based on the Marxist labor theory of value which reduces all factors of production to primary labor inputs. The application of the above theory depends entirely on one condition: the existence of some universal standard for comparing the relative value of labor inputs in various economic sectors. Once this condition is met, then the problem of determining the real values of goods as opposed to their prices is solved without much difficulty. TSU officials believe that in the Soviet economy average wages provide an adequate standard for comparing the quality of labor inputs. They thus see the real level of net revenues generated by each production sector as the function of the quantity and relative quality of labor, where the relative quality is determined in terms of average wage ratios.

The following data base is hence needed for dividing the turnover tax into real revenues generated by industry and agriculture: the size of labor force, the ratio between average wages in industry and agriculture, the turnover tax, and the ratio between agricultural and industrial material inputs into the output of industrial goods whose prices contain the turnover tax. The latter ratio provides information on the participation of the agricultural labor in the final output.

There are two industrial sectors that process agricultural raw materials and whose output price includes the turnover tax: the light and food industry. In 1980, these industries employed 5.2 and 3.2 million persons, whose average monthly wages were 180.2 and 167.2 rubles, and their turnover tax equaled 21.9 and 38.4 billion rubles. The total value of agricultural raw materials sold to these industries equaled 14.2 and 71.3 billion rubles.³² Agricultural inputs comprised 67 and 89 percent respectively of these sectors' total material inputs from other sectors. Thus, the agricultural labor contributed to generating the turnover tax in the amount of 14.7 ($21.9 \cdot 0.67$) and 34.2 ($38.4 \cdot 0.89$) billion rubles. In turn, 3.5 ($5.2 \cdot 0.67$) and 2.8 ($3.2 \cdot 0.89$) million employees were engaged in processing agricultural raw materials in light and food industry.

There were 23 million farmers in public agriculture and 6.5 million persons in private agriculture. Proceeds from sales of agricultural raw materials to the public sector for domestic production comprised 80 and 25 percent of total proceeds in public and private agriculture. It follows, therefore, that 22.7

($23 \times 0.9 + 6.5 \times 0.3$) million farmers produced raw materials, including 4.0 million for the light industry and 18.7 million for the food industry. Average wages in state and collective farms were 149 and 116 rubles a month. For the entire public agricultural sector average monthly wages were around 130 rubles. Wage ratios between light and food industry on the one hand and agriculture on the other equaled 1.4 and 1.3 respectively.

After applying these ratios, one determines that when the quality factor is taken into consideration the number of employees in light and food industry involved in processing agricultural raw materials equaled 4.9 and 3.6 million respectively. The ratio between the turnover tax earned in light industry and agriculture hence equaled 55:45, while that in food industry and agriculture equaled 16:84. The total turnover tax earned indirectly by the agricultural labor hence equaled 35.3 ($14.7 \times 0.45 + 34.2 \times 0.84$) billion rubles or 59 percent of the total turnover tax included in prices on light and food industrial goods in 1980. The same procedure can be repeated for other years of the observed period.

According to estimates performed by Soviet agricultural experts using the input-output data, the turnover tax earned in agriculture equaled 26 billion rubles or 62 percent of the total in 1972.⁵³ Similar results are attained in the present study. Overall, the noted ratio declined insignificantly from 63 to 60 percent during the 1970-1983 period. It is interesting to observe that sharp agricultural price increases of 1983 practically eliminated most of the disproportion between profits earned by agricultural and non-agricultural sectors. Thus, the difference between the real and official agricultural PNI for that year approximately equals the turnover tax earned by the agricultural sector. The excessive profit of non-agricultural sectors in fact decreased from 24 to 2 billion rubles as a result of the price increases.

The whole procedure of accounting for excessive profits earned as a result of low agricultural procurement prices is rejected in this study as contradictory to the general Soviet approach to the estimation of labor productivity. Soviet agricultural experts, for example, focus on the division of the turnover tax and ignore excessive profits. It seems that TSU officials hold the same position but attempt to conceal the extent of Soviet agricultural failures caused by disappointing labor productivity trends. When one takes into account differences between profit margins estimated with official prices and hypothetical prices based on the factor cost analysis, one changes the entire structure of production inside which labor and capital interact in generating a given volume of goods and services. The new structure would lead to new production conditions and hence to a new level of labor productivity that is different from the actual level established in existing production conditions. The reason why the division of the turnover tax does not contradict the existing conditions of production is that the turnover tax is itself excluded from producer prices.

9.3.5 Estimates Based on Western-Type GNP Accounts

Western and Soviet approaches to estimating labor productivity differ in three respects: the scope of productive activities, the price structure, and price changes. The Western-type GNP exceeds the NDP by the amount of depreciation deductions and the output of service and defense sectors. At the same time, the

GNP excludes material outlays of service and defense sectors that are included in the NDP. The data base prepared in this study is sufficient for estimating the Soviet GNP in current prices as well as the total labor force for every year of the observed period. The crucial problem is obtaining the GNP estimates by sector in constant prices that meet Western standards of national accounts. An attempt is made in Section 11 to obtain the output of defense sectors in constant prices using the method of production inputs. Western economists, however, require the estimation of not only profit margins that would exist in market conditions but also real price changes that are not distorted by hidden inflation. It is clear that the available data base is insufficient for deriving results that would meet Western standards in the area of prices without significantly distorting major structural parameters of the Soviet economy as presented in the official statistics. Consequently, some type of compromise is needed that preserves the inner logic of the official statistics while minimizing the distortive effect of official prices. The search for this compromise is, however, beyond the scope of this study.³⁴

END NOTES

¹ For example, refer to A. Goodman and G. Schleifer "The Soviet Labor Market in the 1980s." In U.S. Congress, Joint Economic Committee. *Soviet Economy in the 1980s: Problems and Prospects, Part II*. 97th Congress, 2nd Session, 1982, pp. 323 - 331. These analysts apparently represent the current CIA view on the subject.

² See Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya* (Moscow: Ekonomika, 1969 and 1980), pp. 544-545.

³ The information on working days can be found in four NKh tables on employment in the industrial and construction sectors and on state and collective farms. The number of working days exceeds the actual number of days spent at work by the time spent performing official duties, sick leave and vacation days. The number of working days indicates the period of employment, while the actual number of days spent at work indicates the size of labor inputs. Economists recognize that one-man day (hour) is a better unit of labor inputs than the average annual number of employees for the estimation of labor productivity trends. This study, however, follows the official statistical practice of using the average annual figures. The estimation error resulting from average annual figures is quite insignificant because the ratio between actual and total working days remains stable--around 86 percent in industry, and 88 percent in construction and agriculture. Information needed for the derivation of this ratio for the agricultural sector is drawn from B. Popov and M. Sidorova, *Sotsial'no-Ekonomicheskie Problemy Proizvoditel'nosti Truda i Vosproizvodstva Rabochei Sily v Sel'skom Khozyaistve* (Moscow: nauka 1979), p. 145.

⁴ See TSU, *Itogi Vsesoyuznoy Perepisi Naseleniya v 1970 Godu* (Moscow: Statistika, 1973), p. 147, and L. Volodarskiy, ed. *Naselenie SSSR*, (Moscow: Politizdat, 1983), p. 153.

⁵ T. Kuznetsova, "Resursnoe Obespechenie Lichnogo Podsobnogo Khozyaistva." *Voprosy Ekonomiki*, No. 11, 1984, p. 101.

⁶ Gosplan (1980), p. 548.

⁷ Quoted in *Istoriya Sotsialisticheskoy Ekonomiki SSSR*, (Moscow: Nauka, 1980) Vol. 7, pp. 412 and 517.

⁸ See A. Notkin, ed., *Voprosy Intensifikatsii i Sbalansirovannosti Rasshirennogo Vosproizvodstva v Period Razvitiya Sotsializma*, (Moscow: Nauka, 1981), p. 255, and M. Bor, ed., *Planovyi Balans Narodnogo Khozyaistva*, (Moscow: Ekonomika, 1977), p. 26.

⁹ TSU, p. 162.

¹⁰ Ibid, p. 163.

- ¹¹ Volodarskiy, p. 17.
- ¹² TSU, p. 163.
- ¹³ This trend is based on the analysis of life expectancy rates among males and females in the USSR.
- ¹⁴ See *Vestnik Statistiki*, No. 1, 1977, p. 84.
- ¹⁵ E. Antosenkov and Z. Kupriyanova, *Tendentsii v Tekuchesti Rabochikh Kadrov*, (Novosibirsk: Nauka, 1977), p. 191.
- ¹⁶ Ibid, p. 191.
- ¹⁷ This information was received from Igor Birman.
- ¹⁸ A. Shifrin, *The First Guidebook to Prisons and Concentration Camps of the Soviet Union*, (CH-Seewis/GR, Switzerland: Stephanus, 1980), pp. 9 and 12.
- ¹⁹ The average number of inmates is estimated by multiplying the total number of penal institutions by 1000. The housing capacity of each institution varies from 500 to 3000.
- ²⁰ The professional military is estimated here as the difference between the total armed forces estimated by the US intelligence community (4.7-5.0 million) and the number of draftees (1.9-2.2 million). US intelligence estimates are presented in J. Collins, *U.S.-Soviet Military Balance: Concepts and Capabilities, 1960-1980*, (Washington: McGraw-Hill Publications, Co., 1980), p. 428.
- ²¹ For the division of the Soviet armed forces into branches refer to Collins, pp. 429-439.
- ²² These activities include transportation, communication and supply services connected with weapons production and weapons repair.
- ²³ *Trud v SSSR*, (Moscow: Statistika, 1968), p. 16.
- ²⁴ See L. Berri, et al., *Vosproizvodstvo Sovokupnogo Obshchestvennogo Produkta i Metodologicheskie Problemy Mezhotraslevykh Balansov Stran-Chlenov SEV*, (Moscow: MGU, 1970), p. 142.
- ²⁵ V. Tikhonov, ed., *Agrarnye Problemy Sotsializma*, (Moscow: Nauka, 1980), p. 464. The size of labor force in fishing collectives is estimated here as the difference between the total number of collective farmers and the number of collective farmers working in agricultural collectives.
- ²⁶ Tikhonov, pp. 422-423.
- ²⁷ See Kuznetsova (1984), pp. 100-101.
- ²⁸ *Vestnik Statistiki*, No. 6, 1981, p. 79.

²⁸ *Vestnik Statistiki*, No. 6, 1981, p. 79.

²⁹ V. Belkin and A. Geronimus, eds., *Model' Dokhod-Tovary i Balans Narodnogo Khozyaistva*, (Moscow: Nauka, 1978), p. 235.

³⁰ Ibid, p. 237.

³¹ Refer to Tikhonov, pp. 58-62, and L. Kassirov ed., *Izmerenie Chistogo Dokhoda. Sozdannogo v Otrasyakh Agropromyshlennogo Kompleksa*, (Moscow: Ekonomika, 1982), pp. 70-75.

³² Estimates are presented in Section 4 as material outlays of light and food industrial sectors.

³³ Tikhonov, p.61.

³⁴ It is quite possible that this compromise may be never attained even in theory because no model would be sufficient enough to depict the Soviet economy under market conditions. A more practical solution is for Western economists to learn about Soviet productivity trends from the perspective of Soviet planners.

10.0 CAPITAL RESOURCES AND PRODUCTIVITY

Capital resources consist of fixed and working capital. Fixed capital is operational for several calendar years. It consists of buildings, installations, machines and equipment, means of transportation, tools, agricultural fixed capital and other. Working capital is either consumed within one calendar year or eventually transformed into fixed capital. Some capital whose unit price is too low to classify it as fixed capital (currently below 100 rubles) is also treated as working capital regardless of its operational period. Working capital consists of production inventories (materials, unfinished production and ready goods), commodities stockpiled for consumption and production purposes, unfinished construction projects, and military installations which are excluded from fixed capital in the official statistics.¹

Previous sections that focused on GSP, national income and financial accounts were concerned with total annual changes in accumulated capital resources. By comparison, the present section focuses on the total value of accumulated capital resources and on additions of capital in particular sectors of the economy. Planners compile balances of undepreciated and depreciated capital stock and the balance of inventories. While the balance of undepreciated capital contains information on the average annual value of capital needed for estimating the output-capital ratio, the balance of depreciated capital contains information on annual additions to capital stock needed for estimating net fixed investment (NFI) by sector. The balance of inventories contains information on the average annual value of production inventories and other types of working capital. Capital productivity trends measure changes in the ratio between total net output and the sum of average annual values of all productive capital resources.²

10.1 THE BALANCE OF UNDEPRECIATED CAPITAL

Outside the public agricultural sector, the official statistical coverage of capital stock in current prices is limited to the 1972-1974 period. Moreover, TSU officials always publish data on undepreciated capital stock, thus concealing the NFI by sector. The NKh includes seven sets of tables in current prices: 1) the average annual unappreciated value of capital stock of production sectors, including that of T&C sectors serving households, for 1972; 2) the appreciated value of capital operated by profit-seeking enterprises as of January 1972; 3) the total appreciated value of capital operated by budgetary enterprises as of January 1973; 4) the appreciated value of capital stock by sector, combining profit-seeking, budgetary and private sectors as of January 1973 and 1974; 5) the balance of capital stock, including additions and liquidation of capital, for 1973; 6) the structure of agricultural capital of the public sector; and 7) the structure of industrial capital by sector compiled on the institutional basis. The last two sets of tables are reported for most years of the observed period. In addition, the NKh includes tables on capital stock for the pre-1972 period in constant 1955 prices and for the post-1975 period in 1973 prices.

The tables published in the NKh for 1974 contradict tables published in NKh editions for 1972 and 1973. Differences in the coverage of capital stock are

insignificant for the entire economy, agriculture, and construction, but are large for T&C and housing sectors. It appears that TSU officials began to register non-residential buildings of the housing sector in the amount of 8 billion rubles as part of capital stock of T&C and other service sectors. In this study, all capital will be presented according to the new methodology of registering capital stock introduced in 1974.³

NKh tables on capital stock are also difficult to compare because TSU officials omitted data on particular budgetary and private sectors. For this reason, it is necessary to estimate net additions of capital in 1972 by sector in current prices as the difference between total additions and liquidation of capital. The procedure for estimating total additions was summarized in Section 4. Data on liquidation can be found in Senchagov (1975) for production sectors and in Rutgaizer (1975) for service sectors.⁴ Reducing the officially reported capital stock as of January 1973 by the amount of net additions, one arrives at the value of capital stock as of January 1972 for each sector of the economy. This value exceeds the officially reported capital stock operated by profit-seeking enterprises by the value of capital operated by budgetary organizations and other capital owned by individuals, cooperative housing, urban developments (parks, etc) as well as other unspecified capital.

TSU officials divide capital of profit-seeking enterprises into various production sectors as well as into housing-communal and other service sectors. The purposeful aggregation of other service sectors on the part of TSU officials makes it impossible to determine the value of capital operated by each budgetary sector that is involved in service activities. Estimation results presented in Table 10-1 on the following page indicate that the total appreciated capital of production sectors exceeds capital of profit-seeking enterprises by 5 billion rubles in industry, 4 billion rubles in agriculture, 16 billion rubles in T&C, 1 billion rubles in construction, and 6 billion rubles in T&D as of January 1972.

The independently derived average annual values of capital in all these sectors with the exception of the budgetary T&C sector are, however, the same as those reported in the NKh input-output table on the productive capital. Consequently, both additions of productive capital and productive capital stock reported in the official statistics exclude all defense capital, which is not engaged in the production of the GSP and national income. The above discrepancies in the capital stock found for each production sector can be explained by the fact that the reevaluation of capital was performed on the institutional basis and that budgetary organizations have subsidiary production enterprises. For example, it is known that the USSR Defense Ministry operates a network of industrial, agricultural and trade enterprises.⁵ Similarly, most service sectors provide social dining facilities.

T&C and administration are the only sectors where TSU officials can possibly conceal defense capital. As argued in Section 4, budgetary T&C sectors administer the national network of roads, serve the needs of the armed forces and operate facilities used for space programs. Installations that serve defense purposes, like missile silos, are excluded from the capital stock altogether.⁶ It appears that there is one place where the defense production capital can be possibly hidden in the official statistics--in the total for capital operated by

Table 10-1 UNDEPRECIATED FIXED CAPITAL IN 1972-1974

SECTORS	UNAPPRECIATED CAPITAL in current prices				APPRECIATED CAPITAL in current prices				
	1971	1972	Aver	1973	Appr	1972	1973	1974	1975
TOTAL	758	826	878	898	112	931	1002	1083	1165
PRODUCTION	474	519	558	566	110	575	626	682	741
Industry	232	254	266	277	109	277	300	326	353
a) Profit	228	250	261	272	109	272	294	320	346
b) Budgetary	4	4	5	5	110	5	6	6	7
Agriculture	95	106	113	119	106	113	125	139	153
a) Profit	80	90	97	103		97	110	122	135
b) Private	11	12	12	12	100	12	12	13	13
c) Budgetary	4	4	4	4		4	4	4	5
Transp & Comm	97	105	110	113		129	137	147	159
a) Profit	85	92	96	99	116	113	120	130	141
b) Budgetary	12	13	14	14	135	16	17	17	18
Construction	21	22	24	25		24	26	29	32
a) Profit	20	21	23	24	103	22	25	27	30
b) Budgetary	1	1	1	1	130	2	2	2	2
T&D and Other	29	31	32	33	116	36	38	41	44
a) Profit	23	25	26	27	107	28	30	32	35
b) Budgetary	6	6	6	6	135	8	8	9	9
NON-PROD	284	307	320	332	116	356	376	401	424
Housing	184	195	201	207	113	215	226	240	252
Communal	30	33	34	35	126	44	46	49	52
Educ & Health	48	53	55	57	125	66	70	75	80
Science	10	11	11.5	12	118	13	14	15	16
Administ'n	13	15	16	17	118	18	20	22	24
a) State Adm	4	4	4	4	5	5	6	6	6
b) Defense	9	11	12	13	13	13	15	16	18

the administration sector. Indeed, as evident in Table 10-1 on the previous page, this total equaled 16-18 billion rubles, even though the actual capital stock of the administration sector consists primarily of administrative buildings whose combined value could not exceed 5 billion rubles in the early 1970s.

The proposed hypothesis that the defense production capital equaled this difference of 12 billion rubles in the early 1970s is confirmed by the existence of 1) high depreciation rates on total capital of the administration sector that was observed in Section 3; 2) large investment into M&E for the administration sector that was observed in Section 5; and 3) the disproportionately large capital stock of other service sectors operated by profit-seeking enterprises, which equaled 37.2 billion rubles in January of 1972.⁷ Civilian and defense industrial enterprises often operate under the same institutional umbrella. In order to preserve secrecy about defense industrial activities, planners had to perform the evaluation of capital stock engaged in defense production together with that engaged in the production of the GSP and national income. Otherwise, planners would have had a difficult time explaining the existence of the large M&E stock operated by budgetary enterprises.

The prepared data base is complete enough for updating the above table on unappreciated capital stock in current prices for the post-1975 period. Net additions to undepreciated capital equal the difference between total additions and liquidation of capital. Total additions by sector were estimated in Section 4. The value of liquidated capital can be estimated separately for each sector of the economy. The NKh regularly includes a table on liquidation rates for total industry and for particular industrial sectors. Liquidated agricultural capital can be estimated as a residual since the NKh regularly includes data on this sector in current prices.⁸ The value of liquidated capital in all other sectors is quite small. Thus, one is justified to apply liquidation rates of the early 1970s to the rest of the observed period. These rates were as follows: T&C--0.8 percent; construction--2.2 percent; T&D and housing-communal services--1.0 percent; education, culture, health, and science--around 2 percent. Liquidation rates for capital of the state administration sector apparently approach 1.0 percent, while that of the defense production sector--2.0 percent.⁹ Average annual values are estimated with the assumption that 60 percent of capital is installed in the second part of the year.

The derived value of undepreciated industrial capital can be disaggregated into particular sectors following two independent procedures. The first procedure begins with compiling data on the average annual unappreciated value of capital stock that was reported in the 1972 input-output table of fixed capital and by Soviet authors writing on profit-capital ratios. There are two difficulties with using this procedure: 1) obtaining the value of capital stock for the beginning of the year; and 2) establishing appreciation coefficients on the basis of the reported structure of capital stock in each industrial sector. The disaggregation of total industrial capital as of January 1, 1972, into particular sectors is completed here by dividing net additions of capital in 1972 using a 2:3 ratio.¹⁰ The estimation of appreciation coefficients for each industrial sector is based on the assumption that general appreciation coefficients applied to each type of total industrial capital are also applicable to capital of particular industrial sectors.

The second procedure is less cumbersome than the first one as it utilizes the regularly published NKh table on the structure of total industrial stock by sector in percentage terms. The major difficulty with using this table is that it is compiled for groups of industrial ministries that maintain independent banking accounts. In contrast, all reports on total industrial capital stock in value terms are drawn from NEB tables which are compiled for all industrial enterprises, including those that operate in agricultural, service and other nonindustrial sectors.

Since NEB and input-output tables on fixed capital of particular industrial sectors have never been compared in the openly published Soviet literature, the researcher has no other choice but to assume that these tables are similar with respect to the total value of capital stock. The objective, therefore, is to determine the conversion ratio between the value of the industrial capital estimated for input-output and financial accounts for the early 1970s. Afterward, this ratio can be used to convert the regularly reported financial data into input-output data. The latter is accepted here as the best approximation of the NEB table on fixed capital stock prepared by Soviet planners. The largest discrepancies between financial and input-output reports are observed in MBMW and food industries.

10.2. THE BALANCE OF DEPRECIATED CAPITAL

TSU officials reveal the value of depreciated capital only once in two decades when they publish results of their reevaluation of capital stock. The last time they published their results was on January 1, 1972. TSU results are presented in terms of percentage ratios measuring the degree of depreciation with respect to the appreciated value of capital stock. These ratios were reported as follows: total stock of the public sector--26 percent; industry--28 percent; public agriculture--21 percent; transportation--30 percent; communication--27 percent; construction--31 percent; trade and dining--22 percent; supply and other production sectors--26 percent; housing and communal economy--20 percent; other service sectors operated by profit-seeking enterprises, including those engaged in defense production--22 percent; budgetary sectors--28 percent; and urban public facilities--28 percent.¹¹

This presentation of results was designed to conceal the value of depreciated capital stock that is operated by education, health, science, state administration and defense production sectors, as well as by private and cooperative housing sectors. The gross discrepancy in the operational status of capital in profit-seeking and budgetary service sectors leads one to conclude that replacement rates are much higher in defense production and science sectors than in education, health, road and administration sectors. This conclusion seems quite logical considering that M&E have a much higher replacement rate than buildings and installations. While M&E comprise 50 percent of the capital stock of defense production and science sectors, M&E comprise only 10 percent of budgetary service sectors. In addition, M&E of service sectors have 10 percent more tear and wear than M&E of profit-seeking enterprises. It thus will be assumed here that depreciation ratio for education, health, administration and budgetary T&C sectors was around 30 percent, whereas that for defense production and science sectors was around 20 percent.¹² The above assumption is combined here with the

published TSU data on depreciation ratios to establish the depreciated value of capital stock of major economic sectors as of January 1, 1972.

The estimation of depreciated capital stock operated by particular industrial sector is based here on depreciation coefficients reported by Ovcharenko (1972): coal industry--36 percent; wood working--29 percent; MBMW, construction materials and light industry--27 percent; and petroleum production--23 percent.¹³ Combining the above data with the input-output table on fixed capital, leads to the coefficient for total fuels that equaled 29 percent, power--32 percent; metallurgy--33 percent; chemicals--25 percent; food industry--26 percent; and other industries--28 percent.

Net additions to depreciated capital stock equal the difference between total additions to and the replacement value of capital stock. Total additions are the same as those used in the compilation of the undepreciated capital stock. The replacement value of fixed capital was determined for each sector in Section 3. Consequently, it is possible to compile the balance of depreciated capital for the entire period and for each sector. The increasing gap between undepreciated and depreciated values of capital stock is examined in the next concluding section of this study.

10.3 THE BALANCE OF WORKING CAPITAL

As in the case of fixed capital, the balance of working capital is compiled for the entire economy and for particular economic sectors. The balance of working capital includes four separate parts containing information on production inventories, commodities held in reserve, unfinished construction, and military installations. TSU officials refer to the combined stock of production inventories and commodities as "reserves of commodities and material wealth." As discussed in Section 3, during 1972-1982 TSU officials treated new military construction as additions to unfinished production in the construction sector which forms a large part of production inventories. In reality, planners must exclude military installations, which constitute finished military goods, from production inventories. It is, therefore, necessary to reduce additions of unfinished production by the amount of new military construction, whose approximate size is estimated in Section 3. The value of unfinished construction projects is regularly reported in the NKh for the state-cooperative sector. Annual additions of unfinished construction in the collective sector are estimated independently as the difference between capital investment and installed capital. The total value of unfinished construction projects in the collective sector hence can be estimated in comparison to the total capital investment in the collective sector financed over several decades.

Until 1981, NKh editions regularly included the following tables on production inventories and commodities held in reserve: total stockpiles of major sectors, the structure of stockpiles in industry, agriculture, construction, and trade. Until the mid-1970s, NKh editions also included tables on the structure of stockpiles in particular industrial sectors. It is assumed here that changes in the structure of stockpiles for the entire industry are approximately the same as in

particular industrial sectors. The objective, therefore, is to estimate the total value of production inventories and commodities in each industrial sector.

The NKh regularly includes a table on the profitability ratio for total industry and for particular industrial sectors in both current and constant prices. The profitability ratio measures the amount of profit earned with one unit of capital that was operational during the year. The average annual value of capital has two components--undepreciated fixed capital engaged in the production process and production inventories. Around 98 percent of fixed capital stock is engaged in the production process.¹⁴ The remaining 2 percent is disaggregated into particular sectors proportionally to the value of these sectors' capital stock. The procedure is first to determine the combined average annual value of capital and then to subtract from it the value of fixed capital engaged in the production process. The residual equals the average annual value of production inventories stockpiled by each industrial sector.

Commodities constitute only 2.7 percent of the sum of production inventories and commodities estimated for the entire industrial sector. The commodities consist of ready consumer goods which industrial enterprises store for future sale to trade organizations. The total value of these commodities is disaggregated into particular sectors using the NKh data on the structure of retail trade inventories. It is thus possible to estimate the sum of production inventories and commodities for each industrial sector for the entire period analyzed in this study.

Any attempt to estimate changes in the structure of production inventories and commodities for the post-1980 period for industry and other economic sectors must overcome the problem with the lack of data caused by tightening of the TSU secret code. Not only did TSU officials decide to conceal information on the structure of inventories in particular economic sectors but also on the entire economy. In fact, the only relevant tables retained in the NKh are on the total value of inventories stockpiled by each economic sector, on the total value of commodities stockpiled by trade and industrial sectors, and on profitability ratios in industrial sectors.¹⁵ The researcher thus has no other choice but to continue the trend established during the 1970s.

It can be observed that changes in the structure of inventories were quite steady between 1974 and 1980 in the state-cooperative sector: production materials and young livestock comprised 39.2-39.5 percent of the total, unfinished production--18.2-22.5 percent; finished goods--4.4-4.2 percent; commodities--36.2-32.2 percent; and other--2.0-1.9 percent. Thus, the increase in the percentage share of unfinished production coincided with the decrease in the percentage share of commodities. The percentage share of other inventories remained almost unchanged. The same types of changes, however, cannot be expected for 1981-1984 because continuous increases of unfinished production in construction were accompanied by significant increases in the stockpile of commodities.

It seems that a more precise approach should be based on continuing the trend in the structure of inventories in industry, agriculture, construction, trade and other production sectors. In this way, it becomes possible to account for increases in percentage shares of both unfinished production in construction and

commodities stockpiled by trade organizations. The latter stockpile more than 80 percent of commodities. The results point to the sharp decrease in the percentage share of production materials and young livestock during 1981-1984.

Young livestock has steadily comprised around 42-43 percent of total inventories in agriculture. This fact combined with similarities in the structure of inventories stockpiled by state and collective farmers makes it possible to determine the structure of inventories in the entire public agricultural sector with an insignificant margin of error. Total inventories stockpiled by collectives are estimated in this study using the NKh table on fixed and working capital owned by collectives as well as Soviet sources on the structure of this capital.¹⁶ The value of young livestock owned by private farms is determined in relation to that of public farms using the ratio between the size of productive livestock owned by these farms.

The above procedure leads to the estimation of each sector's production materials as a residual. TSU officials divide production materials into the following components: 1) raw and main materials and unfinished industrial products; 2) auxiliary materials; 3) fuels (without coal and oil extraction); 4) tare and tare materials; 5) spare parts; 6) instruments and tools; 7) seeds and plants; 8) processed feed; and 9) other materials which are small in size. The objective is to disaggregate inventories of industrial materials into sectors of their production. This disaggregation is necessary for determining the end use of particular industrial goods and agricultural raw materials.

The approach proposed in the present study combines the derived results on the structure of the intermediate product with secondary Soviet sources on additions of inventories by sector of their production. Table 10-2 presented below contains information on changes in stockpiling of all inventories--production materials, unfinished production, ready goods and commodities--for the 1959-1970 period.¹⁷ As evident from this table, the percentage share of MBMW and agricultural products increased, while that of light and food industrial products decreased. These changes were caused by dramatic increases in the value of spare parts and instruments, which are produced in the MBMW sector, and unfinished production in agriculture, primarily young livestock. At the same time, the value of commodities consisting primarily of light and food industrial products increased at a much slower rate.

In 1970, total stockpiles of inventories equaled 182.6 billion rubles, including 163.4 billion rubles in the state-cooperative sector, and 19.2 billion rubles in the collective sector. Total stockpiles consisted of the following components: industrial and agricultural materials--55.4 billion rubles; spare parts and instruments--12.3 billion rubles; young livestock--17.2 billion rubles; unfinished industrial production--15.4 billion rubles; unfinished agricultural production--3.2 billion rubles; unfinished production in the construction sector--3.6 billion rubles; ready goods--7.5 billion rubles; total commodities--63.6 billion rubles (including commodities of consumer goods--45.7, and state reserves--17.9). If one assumes that additions of young livestock in private agriculture equaled 0.3 billion rubles, then total additions of inventories in the entire Soviet economy equaled 15 billion rubles in 1970.

Table 10-2 ADDITIONS OF INVENTORIES BY SECTOR OF PRODUCTION

	<u>1959</u>	<u>1965</u>	<u>1970</u>	<u>1970 (plan)</u> (billion rubles)
Total Inventories	100.00	100.00	100.00	15.0
Non-Ferrous Metallurgy	0.06	0.17	0.16	0.5
Ferrous Metallurgy	4.17	3.78	3.55	--
Fuels	5.02	3.32	2.83	0.4
MBMW	17.33	22.12	24.26	3.6
Chemicals	1.83	3.42	4.27	0.6
Wood and Paper	3.40	3.28	2.70	0.4
Construction Materials	1.87	1.39	1.28	0.2
Other Heavy Industry	0.16	0.78	1.38	0.2
Light Industry	32.66	17.59	14.95	2.3
Food Industry	31.38	31.42	25.40	3.8
Agriculture and Other	2.12	12.73	19.22	2.9

Total additions of industrial and agricultural materials equaled 6.0 billion rubles, that of spare parts and instruments equaled 0.6 billion rubles, unfinished production equaled 3.5 billion rubles (industry equaled 0.7, agriculture with young livestock equaled 2.2, construction equaled 0.6), ready goods equaled 0.5 billion rubles (MBMW--0.3, light--0.1, and food--0.1), commodities equaled 3.7 billion rubles (light--1.6, food--1.0, MBMW--0.7, wood and paper--0.1, construction materials--0.1, and other heavy industry--0.2), and state reserves equaled 0.7 billion rubles. Since the structure of inventories of production materials is unknown, the researcher has no other choice but to assume that it resembles with some modifications that of the intermediate product derived in Section 4.

In 1970, this structure was as follows: metallurgy equaled 11.2 percent, fuels equaled 8.6 percent, power equaled 2.8 percent, MBMW equaled 14.5 percent, chemicals equaled 6.2 percent, wood and paper equaled 5.2 percent, construction materials equaled 6.4 percent, other heavy industry equaled 1.3 percent, light equaled 13.2 percent, food equaled 10.2 percent, agriculture equaled 19.1 percent, and other equaled 0.6 percent. The output of the power industry is not stockpiled, thus 2.8 percent must be distributed between sectors proportionally to their output of production materials. Additions of inventories of production materials were as follows: metallurgy equaled 0.7 billion rubles, fuels equaled 0.5 billion rubles, MBMW equaled 1.1 billion rubles, chemicals equaled 0.4 billion rubles, wood and paper equaled 0.3 billion rubles, construction materials equaled 0.4 billion rubles,

other heavy industry equaled less than 0.1 billion rubles, light industry equaled 0.8 billion rubles, food industry equaled 0.6 billion rubles, and agriculture equaled 1.3 billion rubles. State reserves was divided into three sectors of production: MBMW equaled 0.2 billion rubles, food equaled 0.2 billion rubles, and agriculture equaled 0.3 billion rubles.

Total inventories of MBMW products equaled 3.6 billion rubles ($1.1+0.2+0.6+0.7+0.3+0.7$); wood and paper equaled 0.4 billion rubles ($0.3+0.1$); construction materials equaled 0.5 billion rubles ($0.4+0.1$); light industry equaled 2.5 billion rubles ($0.8+1.6+0.1$); food equaled 1.9 billion rubles ($0.6+0.2+1.0+0.1$); and agriculture equaled 4.4 billion rubles ($1.3+0.3+2.2+0.6$). It appears that planners grossly underestimated additions of inventories of agricultural products but overestimated those of food industrial products in their planning forecasts for 1970. Indeed, the NKh data on inventories in wholesale trade indicated the decline in stockpiles of food products between 1969 and 1970 that was not repeated during other periods. Planners were quite close to their predictions with respect to inventories produced in other sectors of the economy. This observation justifies using the proposed approach to disaggregating additions of inventories into sectors of production for all other years analyzed in this study.

10.4 STATE RESERVES AND MILITARY CONSTRUCTION

The above discussion focused on the entire stockpile of inventories as it is reported in the official statistics. In contrast, planners would divide the officially reported total for inventories into actual inventories, state reserves and military construction. In addition, they compile data on inventories separately for civilian production, non-production and defense sectors. The official statistical coverage of inventories is designed in such a way as to prevent researchers from estimating the amount of inventories stockpiled in the defense industry and for reserve purposes. This author originally estimated state reserves in a crude way as the difference between total stockpiled commodities and commodities stockpiled in trade and civilian industry. This difference unrealistically doubled from 18 to 36 billion rubles during the 1970s. This author later realized that the above approach fails to account for the fact that some commodities are stockpiled as inventories in service and defense industrial sectors. In an attempt to improve the quality of estimates it is necessary to establish at least an approximate amount of commodities stockpiled by these sectors.

The NKh table on total inventories by sector includes an entry for other sectors. The latter stockpiled inventories whose value doubled during the 1970s from 6 to 12 billion rubles. It can be demonstrated that most of these inventories are stockpiled by service and defense industrial sectors. Material outlays of other production sectors constitute 15 percent of material outlays of T&C sectors. This suggests that material outlays of other production sectors increased from 0.5 to 1 billion rubles during the 1970s. Inventories of subsidiary construction organizations operating in production sectors are included together with those of industry, agriculture, etc.

It follows, therefore, that inventories of service and defense industry increased from 5.5 to 11 billion rubles. There are two reasons why inventories of

defense industry are registered separately from those of the civilian industry. First, commodities stockpiled in civilian industry are for household consumption. Second, production inventories stockpiled in defense industry are not used in the production of the GSP and national income and thus by definition must be registered as commodities. According to planning practices, all production inventories are used in the production of the GSP and national income. Estimated as a residual, state reserves increased from 12.5 billion rubles (18-5.5) to 25 billion rubles (36-11) during the 1970s. Combined inventories of service and defense sectors can be disaggregated only approximately using the derived ratio between material outlays of service and defense industrial sectors. This ratio decreased from 55:45 to 50:50 during the 1970s.

Similarly to stockpiles of commodities, military installations are not used for civilian production purposes. For this reason, it is necessary to divide unfinished production in the construction sector into civilian and defense components. This procedure was performed in Section 3 as part of an attempt to estimate the construction price index. The reason why TSU officials decided to conceal construction of military installations together with inventories is not difficult to find: there is simply no other place in national income accounts. Their decision seriously undermined the reliability of the official statistics as a source of data on capital resources for thousands of Soviet economists working on factors influencing productivity trends.

10.5 CAPITAL PRODUCTIVITY TRENDS

Capital productivity trends measure annual changes in the ratio between net output and capital resources both measured in the same constant prices. The price base used most often during the observed period in the official statistical publications is 1973. The NKh regularly includes a table on the growth of capital resources for the entire civilian production sector, industry, agriculture, T&C and construction in 1973 prices. The growth of net output was analyzed in the previous section. Thus, no separate data base is required for estimating capital productivity trends in the civilian production sector, except for disaggregating T&C capital into productive and non-productive sectors using a 60:40 ratio. By comparison, additional calculations must be made to determine capital productivity trends following Western methodology because the official statistics exclude data on the growth of inventories stockpiled by service and defense industrial sectors which are registered in the official statistics as stockpiles of commodities. Additions to these stockpiles consist primarily of MBMW and food products whose price indexes were estimated in Section 3.

END NOTES

¹ See Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), pp. 616 - 619, for the discussion of capital resources. No discussion of military construction can be found in the Soviet literature. It is commonly assumed by both Western and Soviet economists that military construction is treated by planners as additions to fixed capital of T&C sectors. However, as demonstrated in Sections 3 and 4 dealing with construction works and net additions of capital, military construction has always been excluded from additions to fixed capital.

² Many Soviet and Western economists often limit the analysis of capital productivity trends to the ratio between net output and fixed capital stock. The results of such an analysis indicate the return on fixed capital investment. In order to estimate the overall productivity of capital resources it is necessary to divide the net output by the entire capital stock, including production inventories.

³ Following the new methodology for the pre-1974 period poses major difficulties connected with the estimation of capital investment into the non-residential housing sector that began to be registered as that into T&C sectors. It is assumed here that the ratio between capital investment into this non-residential housing and total investment into the housing sector is the same the ratio between this non-residential housing stock and total housing stock. This assumption makes it possible to avoid the over-estimation of residential housing whose depreciation is entered as private consumption in Soviet national income accounts.

⁴ V. Senchagov, et al. *Amortizatsyonnyi Fond V Usloviyakh Intensifikatsii Proizvodstva*, (Moscow: Finansy, 1975), pp. 9 and 68, V. Rutgaizer, *Resursy Razvitiya Neproizvodstvennoi Sphery*, (Moscow: Mysl', 1975), pp. 129, 135, 138, 140, 142, 151 and 152.

⁵ M. Shermenev, ed., *Gosudarstvennyi Byudjet SSSR*, (Moscow: Finansy, 1978), p. 313, and N. Sychev, et al. *Finansy SSR*, (Moscow: Finansy, 1979), pp. 143, 144, and Gosplan (1974), p. 609.

⁶ The approximate list of military installations that are excluded from capital stock can be compiled using the same principle applied to defense industrial goods. Those installations that serve both civilian and defense purposes are included in capital stock, while those installations that serve only military purpose are excluded from capital stock.

⁷ See NKh 1972, p. 63.

⁸ The agricultural capital is presented in Table 3B3 in Volume II in this study.

⁹ These rates are assumed to be the same as those of the housing-communal and MBMW sectors respectively.

¹⁰ This ratio was derived independently for the total industrial sector for 1972. The same ratio is widely assumed by both Soviet and Western economists in estimating the average annual value of fixed capital. For example, refer to U. S. Congress, Joint Economic Committee, *U.S.S.R.: Measures of Economic Growth and Development, 1950-80*, 97th Congress, 2nd Session, 1982, p. 157.

¹¹ See NKh 1972, p. 63, and NKh 1973, p. 61.

¹² These assumptions are based on the observation that liquidation rates are the lowest in service sectors and highest in defense production sectors.

¹³ G. Ovcharenko, "K Itogam Pereotsenki Osnovnykh Fondov." *Vestnik Statistiki*, No. 12, 1972, p. 41.

¹⁴ As noted by I. Malyi and V. Sis'kov, eds., *Kurs Statistiki Promyshlennosti*, (Moscow: Statistika, 1978), p. 333, in their estimation of the profitability ratio, planners reduce fixed capital stock by the amount of capital for which enterprises make reduced budgetary payments. This capital is held in reserve and hence is not engaged in the production process. In the example given by these authors this capital comprises 2 percent of the total capital stock. The same ratio is cited in V. Garbuzov, ed., *Finansovo-Kreditnyi Slovar'*, Vol. 1, (Moscow: Finansy, 1984), p. 38, in regards to capital that is not depreciated.

¹⁵ Beginning in 1981 *Vestnik Statistiki* began to include tables on sources of financing working capital in major economic sectors. These tables, however, exclude information on the structure of inventories. It can be speculated that the TSU decision to exclude information on the structure of inventories was prompted by the rapid increase in the value of unfinished works in the construction sector, which include military construction.

¹⁶ See P. Gusev, *Zakonomernosti Razvitiya Kolkhozno-Kooperativnoi Sobstvennosti v Usloviyakh Zrelogo Sotsializma*, (Moscow: Nauka, 1982), pp. 46-49, and V. Tikhonov, ed., *Agrarnye Problemy Sotsializma*, (Moscow: Nauka, 1980), p. 316.

¹⁷ Quoted in A. Pokrytan and V. Lapin, *Fond Vozmeshcheniya i Podrazdeleniya i Problema Sbalansirovannosti*, (Moscow: Ekonomika, 1982), p. 97.

PART VI
THE DEFENSE ECONOMY

11.0 MILITARY EXPENDITURES

The proposed estimation of Soviet military expenditures follows the view of Soviet planners with regard to compiling national accounts. The author disagrees with advocates of the traditional view that data on weapons procurement can be extracted from the published Soviet statistics. The author argues that these advocates either grossly underestimate Soviet military expenditures or ignore the major precepts of Soviet national accounts. By excluding weapons production from the gross social product (GSP), Soviet planners are able to conceal the extent of the Soviet military drive and at the same time are able to preserve the inner logic of national accounts. It is possible to estimate the weapons procurement bill as the total cost of capital and labor inputs. The following discussion is based on the detailed study of Soviet national accounts presented in the preceding sections.

11.1 CRITIQUE OF WESTERN ESTIMATION METHODS

Western economists have made several attempts to estimate Soviet military expenditures using official statistical publications. The initial attempt, which has been criticized by most economists since the late 1960s, is based on the assumption that the official defense budget represents a substantial portion of the total defense budget.¹ A more popular approach developed by Becker and a number of other Western economists is based on estimating the investment residual (gap) using published national income accounts and on making assumptions about expenditures on the armed forces and defense science.

Lee recognized that the growth of the investment gap in national income accounts was too small compared with the physical growth of Soviet weapons.² He estimated the weapons procurement as the difference between the total supply of MBMW products and the sum of their end use by the civilian economy and exports. While Lee discovered a residual in the MBMW sector that much exceeded the investment gap, he did not explain where the excess demand for MBMW products is hidden in Soviet national accounts. In fact, the sum of depreciation in the production sector and national income equals the total amount of resources available for end use.

In his recent attempt to improve Becker's and Lee's approaches, Duchene suggested other segments of national income accounts where military expenditures might be hidden: material outlays of household service sectors and net additions of fixed capital in the T&C (10 percent of the total) and service sectors.³ He speculated that consumption by the armed forces constitutes 5.3 percent of the total household consumption. He then used this ratio to account for military expenditures hidden together with current and capital outlays of household services. He also speculated that military expenditures account for 50 percent of all material and capital outlays of science and administration sectors.

Duchene's work invites four major criticisms. First, he made no attempt to estimate the actual consumption gap in Soviet national income that equals non-food consumption by the armed forces. Purchases of food by the armed forces are hidden together with retail trade purchases and indeed can be estimated only approximately by comparing the size of the armed forces with the total Soviet population. However, non-food consumption by the armed forces includes spare

parts for weapons repair, fuels, chemicals and other heavy industrial products. Consumption of these products cannot be compared with household consumption. Even though Duchene's ratio of 5.3 percent makes no economic sense, his idea of expanding traditional Western thinking on institutional boundaries of military buildup is supported by the author of this study. Unfortunately, the published Soviet statistics are insufficient for analyzing the military consumption of household services with any precision.

Second, Duchene did not substantiate his estimates for military expenditures of the science and administration sector. This can be done by analyzing sources of financing for Soviet research activities and the institutional structure of administrative expenditures. An extensive data base on capital stock and depreciation is needed to determine what military expenditures are hidden by planners in the administration category. The results presented in this study indicate that military expenditures account for 40 percent of combined material and depreciation outlays of science and administration sectors.

Third, Duchene's argument that a substantial amount of defense capital is hidden in the T&C capital stock is unconvincing. Even though the official statistics on capital stock published in the mid-1970s indicate that as much as 10 percent of the T&C capital stock is operated by budgetary organizations, it still must be proven that all this capital is employed for military purposes. As known, state budgetary allocations cover maintenance of all large bridges, highways and some civilian communication facilities whose combined value comprises more than half of this 10 percent. Capital of T&C sectors serving the armed forces, including space facilities, apparently comprises the remaining 5 percent of the total T&C capital stock operated with budgetary funds.

The fourth and major problem with Duchene's method is that he failed to respond to the crucial question already raised by critics of Lee's work--how do Soviet planners conceal the enormous weapons buildup in a relatively small investment gap? His estimate of this gap (also poorly substantiated, especially after 1975) seems too low to include the entire Soviet weapons procurement.

Wiles, in answering the above question, recognized that Lee's method must be reconciled with national income accounts and proposed to divide the entire weapons procurement into two parts: net additions to weapons stock and weapons write-offs.⁴ While net additions are hidden in the investment component of national income, weapons write-offs are hidden in depreciation accounts of the production sector. Wiles' method is based on the belief that Soviet planners treat soldiers as productive workers and their weapons as productive fixed capital engaged in manufacturing the GSP and national income. In his revised work, Wiles indicated that no part of the produced national income can possibly contain soldiers' wages. He did not acknowledge, however, that by the same token no production sector has weapons in its capital stock. Depreciation accounts of production sectors contain only two components: replacement and repair of capital engaged in production of the GSP and national income. If one wanted to carry Wiles' argument to its logical conclusion, than it would appear that weapons can be used to produce or to deliver goods. Wiles himself would not agree with this erroneous conclusion.

11.2 SOVIET PLANNERS' VIEW

All of the above methods of estimating Soviet military expenditures stem from the same idea, originally proposed by Soviet academic economists, that the output of defense industries constitutes part of the GSP and national income. In their unswerving adherence to this idea, Western economists have failed to reconcile the reality of Soviet military preparations with the theory of Soviet national accounts. Western economists have paid little attention to the fact that Soviet planners have never supported the view of their academic colleagues. Strumilin and Bor, former senior Gosplan officials, emphasized on several occasions that weapons are neither producer nor consumer goods.⁵ While Soviet academic economists themselves cannot defend the view that weapons are either producer or consumer goods, they are convinced that planners treat weapons as producer goods only for reasons of convenience, i.e., for preserving a Soviet state secret.⁶

The above view is convenient to planners because its acceptance leads to the underestimation of the Soviet military drive. The only trace of weapons production that academic economists can find is the value of defense materials. The part of Soviet military expenditures that equals value added of defense industrial enterprises remains outside their scrutiny. In addition, the above view leads to the erroneous belief that these enterprises earn profit like their Western counterparts. Indeed, planners' misinformation campaign must be considered as one of the most successful in Soviet history. Estimation results presented in this study confirm a commonsense argument that for the last two decades planners' practice has been to exclude weapons production from the GSP and national income.

There is little need to question the validity of Soviet economic planning practice in the area of defense on theoretical grounds. The fact that their practice serves them well in concealing the true extent of the Soviet military drive provides a sufficient justification for their action. What must be explored instead is how their practice makes it possible for them to value the weapons production only in terms of factor cost and thus artificially lower the size of military expenditures that appears even in their own accounting ledgers.

In his recent book, Suvorov--himself a former Soviet intelligence officer--emphasized that the USSR Defense Ministry does not pay for armaments and its budget only covers the cost of maintaining the armed forces.⁷ What follows from this is that Soviet defense production enterprises are budget-supported like the USSR Defense Ministry and hence do not earn profit by definition. Soviet profit-seeking enterprises receive budgetary subsidies only when a special state pricing policy deprives them from earning profit. Budget-supported enterprises never earn profit for their activities and must submit all unspent revenues back to the source of their financing, i.e., the state budget.

How much artificial profit should be added to defense production inputs for estimating the total value of Soviet armaments is an irrelevant issue with respect to analyzing Soviet economic priorities in billions of rubles. Any attempt to make Soviet accounts less artificial by allocating profit to one sector and subtracting excessive revenues earned from another would result in radical restructuring of all linkages between Soviet economic sectors. The end result

would be the creation of a new economic system with only a marginal resemblance to the Soviet economy. The uselessness of this exercise then would be exposed. One lesson to be drawn from this exercise is that any economic structure should be studied in terms of how it functions rather than focusing on the artificiality of its existence. What seems artificial to Western observers may be quite natural to Soviet planners and vice versa.

The desire on the part of Soviet planners to minimize the impact of the defense burden and to squeeze the maximum out of every ruble spent on defense stems from their belief that investment into defense has no positive effect on the civilian economy. Unlike Western economies, the Soviet civilian economy does not benefit from technological breakthroughs made in the defense sector. Nor does it benefit from the stimulation of consumer demand because the economy has no resources to satisfy this demand. The proposed analysis is thus limited to duplicating planners' accounting system. Profit is added to the cost of weapons only for the purpose of facilitating international economic comparisons. The rate of profit established in the MBMW sector (around 15 percent) seems adequate for measuring the imaginary profit of Soviet defense industries.

11.3 MILITARY EXPENDITURES IN SOVIET NATIONAL ACCOUNTS

Economists discuss the structure of military expenditures from the institutional and budgetary perspectives. Six types of institutions directly participate in Soviet military buildup: 1) the armed forces subordinated to the Defense Ministry, the KGB and the Ministry of Internal Affairs; 2) defense industrial enterprises that manufacture weapon systems; 3) enterprises engaged in construction of military installations; 4) defense-related science organizations; and 5) higher planning agencies and public organizations.

All five of these institutions have six similar items on their budget list: materials for current use (including system components, spare parts, tools as well as consumption by the armed forces), capital repair, capital investment (replacement and additions of fixed capital), additions of inventories, wages, and social security deductions. Military pensions and stipends constitute the only unique categories of expenditures. Altogether, there are 32 ($5 \times 6 + 2$) items on the total defense budget list. For each of these items, planners have reserved a unique place in Soviet national accounts.

Table 11-1, on the following page, is designed to demonstrate the usefulness of each set of Soviet national accounts for analyzing particular economic aspects of the Soviet military drive. The balance of labor resources is useful for estimating total defense industrial labor and the size of the armed forces and military pensions. The balance of capital resources contains information on fixed and working capital of defense organizations. Reconstruction of national income accounts leads to total material and depreciation outlays of defense industrial enterprises, total consumption by the armed forces, and net investment into defense industry. The GSP accounts are useful for analyzing the structure of final demand in the defense sector. The integration of GSP and national income accounts in the area of capital investment leads to the

value of new defense construction. Total monetary income of employees in defense industry and the armed forces can be estimated as the difference between total monetary outlays and income of all Soviet households.

**Table 11-1 DIRECT MILITARY EXPENDITURES IN
SOVIET NATIONAL ACCOUNTS**

<u>Resources of Labor & Capital</u>	<u>National Income Accounts</u>	<u>GSP Accounts</u>	<u>Household Budgets</u>	<u>State Budget</u>
a) Defense Industrial Labor	Defense Finances a) Materials	Structure of a) Defense Materials	a) Income of Defense Employees	a) Official Defense Budget
b) Armed Forces	b) Capital Depreciation	b) New Defense Capital	b) Their Consumpt'n of Goods & Services	b) Defense Science
c) Military Pensions	c) Construction	c) Defense Construction		c) Social Security
d) Defense Capital	d) Consumption by Armed Forces	d) Consumption by Armed Forces		d) Total Deficits
	e) Net Capital Investment			

The usefulness of state budgetary statistics is limited to estimating outlays on defense-related science and to social security deductions of defense industrial enterprises and the military administration. After 1970 the official defense budget no longer became connected to any part of the real defense budget.⁸ In the process of analyzing state budgetary accounts this author discovered gross discrepancies between Soviet military expenditures estimated using the GSP and national income accounts and those estimated using state budgetary statistics. These discrepancies are tantamount to state budgetary deficits. Since the state budget is based on the GSP and national income accounts and to a great extent serves a propagandistic purpose, the exclusive reliance on the budgetary statistics leads to the gross underestimation of the Soviet military drive as well as to the erroneous belief that the Soviet economy does not suffer from budgetary deficits.

It thus becomes evident that the objective of estimating Soviet military expenditures is attainable only after combining all sets of Soviet national accounts. While each set of national accounts contains information on particular components of military expenditures, unified national accounts contain information on total budgets of institutions directly participating in military buildup. The total budget of the armed forces represents their operating expenditures without military construction, pensions and stipends. The total budget of defense industrial

enterprises equals the weapons procurement bill. The total budget of defense-related science organizations equals the cost of military RDT&E. Published Soviet national accounts are useless for estimating indirect military expenditures connected with civil defense measures, administrative expenses of higher echelons of defense economic planning and volunteer military organizations, military propaganda, and other such activities. Financing of these military-related activities is hidden in budgets of service sectors.

11.4 MAJOR FINDINGS

Major findings presented below confirm this study's major thesis that Soviet planners exclude weapons production from the GSP and national income. Major findings are discussed here in terms of eight gaps found in the official statistics, which represent direct military expenditures. The author also offers approximate estimates of indirect military expenditures.

11.4.1 Labor Gap

The Soviet population consists of four groups: the official labor force (including self-employed), pensioners and disabled, dependents (both children under 16 and adults) without counting college students, college students, and the unaccounted population. The size of the unaccounted population increased from 12.5 to 16.5 million persons between 1970 and 1984.⁹ The number of unemployed and prisoners increased from 3.5 to 5.5 million during that period. The remaining 9 to 11 million of able adult persons work in the state sector but are excluded from the official labor force. It is concluded here that these persons serve in the armed forces (5-6 million) and work in the defense industry (4-5 million). It thus appears that the official industrial labor force excludes defense employees. The latter account for 12 percent of the total industrial labor and 25 percent of the total MBMW labor.

11.4.2 Capital Gap

All fixed and working capital of the industrial sector reported in the official statistics is engaged in the production of the GSP and national income.¹⁰ The entire depreciation of industrial fixed capital is excluded from national income. In turn, the entire industrial working capital is used by planners in their calculation of the industrial profitability ratio.¹¹ It thus appears that planners conceal defense industrial capital together with capital of service sectors. The analysis of the structure of capital investment indicates that a relatively large amount of new M&E is installed in the administration sector whose capital stock exceeds that of the entire science sectors.¹² The administration sector has little need for M&E and the enormous size of its capital stock is quite puzzling, especially considering that roads and bridges are registered as part of the T&C capital stock.¹³ In addition, Soviet economists never analyze capital stock of so-called "administration and other sectors."

On the basis of this evidence, it is concluded here that fixed capital of the defense industry is hidden together with capital of the administration sector. It more than doubled from 14 to 34 billion rubles during the observed period. It accounts for 6 percent of the total industrial fixed capital and 20 percent of the

total fixed capital employed in the MBMW sector. Inventories of the defense industrial sector comprise around 50 percent of those of service sectors. Their size increased from 3 to 10 billion rubles which equal around 5-6 percent of the total industrial working capital during 1970-1984.

11.4.3 Depreciation Gap

Depreciation of capital operated in service sectors is treated as public consumption in national income accounts. Depreciation in the administration sector is disproportionately large compared to that of other service sectors. In 1975 it equaled 2.5 billion rubles. This is partly caused by the fact that in national income accounts the road administration and other budget-supported T&C sectors are excluded from household services and are thus grouped together with science and administration sectors.¹⁴ In 1975, depreciation of capital operated in budget-supported T&C sectors amounted to 0.9 billion rubles. The remaining 1.6 billion rubles equal capital depreciation in the administration sector, including 1.3 billion rubles in the defense industry. Depreciation of capital operated in the defense industry increased from 0.8 to 2.5 billion rubles during 1970-1984.

11.4.4 Investment Gap

The investment component of Soviet national income includes the following elements: net additions of fixed capital, net additions of unfinished construction, net additions of inventories, and so-called "other expenditures," referred to here as the investment gap. All economists recognize that the investment gap represents the sum of some type of reserves and military expenditures. The traditional view is that the investment gap contains the value of weapons procured by the USSR Armed Forces and all types of reserves. The view advocated in this study is that between 1972-1982 the investment gap equaled the sum of materials used in the defense industrial production and changes in the stockpile of strategic reserves. State reserves are hidden together with inventories. During other years it also included the value of defense construction works.¹⁵

Between 1971 and 1972 the sum of defense materials and changes in strategic stockpiles declined by 4.8 billion rubles, while between 1982 and 1983 it increased by 7.6 billion rubles. If the trend established before 1972 is continued, then in 1972 this sum should have exceeded the derived investment gap by around 5.9 billion rubles. This discrepancy can be partly explained by the fact that strategic grain reserves were depleted in 1972 by around 2.4 billion rubles. Changes in strategic grain reserves are estimated here as a residual after accounting for all other end use of supplied agricultural goods. Annual fluctuations of other strategic reserves are insignificant in size and are correlated here with changes in the total investment gap. The remaining discrepancy of around 3.5 billion rubles (5.9-2.4) remains a puzzle unless its mysterious existence is compared to discrepancies found in the process of estimating the construction price index.¹⁶

This index equals the ratio between capital investment in current and constant prices. The official statistics regularly include data on construction works treated as capital investment in constant prices. Capital investment in current prices equals the difference between the total construction GVO and the sum of capital repair works and additions to unfinished production in the construction

sector. The derived index increased incrementally after 1972 but between 1971 and 1972 it decreased by as much as 8 percent. No price changes were known to take place during that period. The only conclusion that can be reached is that before 1972 the difference between the total construction GVO and the sum of capital repair works and additions to unfinished production included "excessive" construction works that are not part of capital investment.

Since it is impossible to find defense installations in published statistics on additions to fixed capital stock, one must conclude that defense construction works represent these "excessive" construction works. In 1972, these "excessive" works no longer can be found in the construction GVO, while additions to unfinished production skyrocketed by 5 billion rubles and the investment residual plunges by the same amount. There was no reason for unfinished production works in the construction sector to increase so dramatically in 1972.

In an attempt to conceal the true extent of Soviet military preparations planners apparently decided to include defense construction together with unfinished production. Their decision coincided with their compilation of the detailed input-output table containing much more information than the regularly published official statistics. It also coincided with their first and last publication of data on fixed capital stock in current prices. The reverse situation took place in 1983 when planners decided to return to their pre-1972 practice, which was theoretically more correct. What apparently prompted their decision this time was that the unrealistically high volume of unfinished production became much more embarrassing than the well-concealed investment gap. The latter is difficult to estimate after 1975 when planners began to conceal additions to fixed capital stock. These additions are estimated here as the difference between total additions and replacement of fixed capital. Estimated as a residual, defense industrial materials almost tripled from 11.2 to 30.8 billion rubles during the observed period. The value of defense construction works in turn increased from 3.8 to 5.3 billion rubles.

CIA and most other Western analysts who analyzed the investment gap made an error by assuming that unfinished production in the construction sector constitutes part of unfinished construction works which are financed by means of capital investment.¹⁷ In contrast, unfinished production in the construction sector is financed through budgetary channels which are outside capital investment. This error prevented Western analysts from estimating the investment gap with the required precision.¹⁸ Western analysts also made little attempt to estimate net additions of fixed capital for the post-1975 period.¹⁹ Without such an estimate Western analysts could not learn about the growth of the investment gap after 1975.

In addition, Western analysts never justified their crucial assumption that only the output of sectors manufacturing weapons is hidden in the investment gap. Although the structure of the investment gap cannot be analyzed with the same precision as that of other gaps found in the official statistics, the available evidence clearly contradicts the above assumption. The investment gap appears to contain metallurgical products, fuels, power, wood products and other materials produced in sectors that do not manufacture finished military goods. The value of materials comprising the investment gap is estimated as a residual after accounting for all other end use of supplied industrial goods.

11.4.5 Consumption Gap

The consumption gap equals the difference between total consumption and the sum of household and civilian public consumption. Until 1975 TSU officials divided total consumption into private and public. They hypocritically included material outlays of the armed forces together with household consumption, which consists of retail trade purchases of consumer goods produced during the current year and productive-type utilities, consumption-in-kind (goods both produced and consumed by households and wages paid in the form of food), and depreciation of residential housing. Public consumption consists of material and depreciation outlays of sectors serving households, science, and state and road administration. Western analysts could not estimate the consumption gap for the pre-1976 period because they made no attempt to estimate total household consumption as it is estimated by planners in national income accounts. Since 1975 Western analysts have faced an additional challenge of estimating public consumption.

In an attempt to conceal the gap between total and civilian consumption the authors of the official statistics have created three traps connected with the estimation of each segment of household consumption.²⁰ Unaware of these traps, the researcher would never find the gap.

First, household consumption of goods purchased at retail trade stores and ex-village markets is smaller than the total retail trade turnover by the sum of second hand and producer goods as well as goods purchased by public organizations. Altogether, around 8 percent of the total retail trade turnover must be excluded from the private consumption fund of national income without even counting purchases of food products by the armed forces which comprise another 0.8 percent of the total turnover.

Second, CIA's and similar methods of pricing the output of private producers, which is published in physical units, is inherently flawed because planners conceal data on differences in prices set on agricultural goods that are exchanged and not exchanged for money. Estimates based on these methods lead to the overestimates agricultural consumption-in-kind by as much as 30 percent. In this study, it is estimated as the difference between the total net output of private producers and investment-in-kind. Secondary Soviet sources and input-output studies indicate that other types of consumption-in-kind are relatively small and change little every year.

Third, estimates of residential housing depreciation offered by Soviet economists, such as Sverdlik, are based on using outdated depreciation rates, which are different in public and private sectors, and on applying these rates to the appreciated value (or in constant prices) of housing stock before January of 1975. These Soviet economists also fail to note that 6 percent of buildings operated by the housing sector is not used by households. These buildings are used by the armed forces and are rented by public organizations. Because of the above three reasons Sverdlik overestimated housing depreciation by as much as 40 percent or by 3 billion rubles in 1972.

Since Soviet authors make no effort to avoid the above three traps, it is not surprising that they find little divergence between total private consumption

and household consumption, which they blame on their crude estimation methods. It does not occur to them that their derived structure of private consumption differs substantially from the actual structure derived by planners. The difference stems from the fact that per capita consumption of MBMW products and fuels by the armed forces is much larger than that found in the household sector.

The structure of consumption of heavy industrial products by the armed forces is determined here by subtracting household and public consumption and inventories from the total supply of these products. The production of these products is registered as part of Group "B" in the official statistics. Military consumption of these products more than tripled from 5.3 to 15.7 billion rubles during 1970-1984. Consumption of light industrial products (mainly uniforms) by the armed forces is estimated here using secondary Soviet sources on wholesale purchases of these products in the early 1970s. The results are then extrapolated with respect to the growth of the armed forces and price index in light industry. The total value of these products doubled from 0.6 to 1.2 billion rubles. According to CIA estimates, food consumption by the armed forces equaled 1.4 billion rubles in 1970.²¹ Food industrial products comprise more than 90 percent of total food products consumed by the armed forces or 1.8 billion rubles. This indicates a per capita consumption of 380 rubles a year in 1970 prices compared to 325 (78:240) rubles for the entire Soviet population. If one assumes that the same per capita consumption remained the same during the observed period, then by 1984 consumption of food products by the armed forces reached 3.6 billion rubles. Total consumption by the armed forces increased from 7.9 to 20.5 billion rubles

11.4.6 Wage Gap

Even though CIA and other Western analysts always find the wage gap in their analyses of Soviet household budgets, they never connect this gap with hidden wages of defense industrial employees.²² As they have little confidence in the precision of their estimates, CIA analysts attribute the gap to their imperfect knowledge of Soviet national accounts. There are two reasons why CIA analysts fail to mention wages of defense industrial employees.

First, CIA analysts believe that they already account for these wages in their estimates of total income of production employees. This belief stems from the CIA practice of following Becker's approach to estimating Soviet military expenditures, according to which these wages are included in the produced national income. The entire credibility of Becker's approach hinges on the assumption made by Soviet academic economists that the value of weapons is hidden in the investment gap. The fact that CIA analysts find the wage gap in the amount of 7.5 billion rubles for 1970 (even after accounting for wages of the military in the amount of 3.4 billion rubles) should have been a sufficient reason to question the validity of Becker's approach.

Second, CIA analysts made several estimation errors which prevented them from finding a larger wage gap. Only two major errors of not counting unorganized household savings (unspent money that are kept at home) and relying on Soviet authors' figures for household outlays on services resulted in the underestimation of total household outlays by 7 billion rubles for 1970. All errors causing the underestimation of both total outlays and income largely cancel each other and result in the net error of around 3.5 billion rubles, which grows larger

each year of the post-1970 period. The wage gap (without military pay) thus equaled around 10.5 rather than 7.5 billion rubles

The author of this study first determined the total wage gap and then disaggregated it into wages paid to defense industrial employees and the armed forces.²³ The total wage gap is determined here as the difference between total monetary outlays and income of households. This approach somewhat simplifies the CIA method of counting both monetary and non-monetary transactions in the household sector. Total monetary income includes: 1) regular wages; 2) other monetary earnings of public employees; 3) gross monetary income from private agriculture; 4) interest income; 5) transfers from the state budget (bonds and lotteries); 6) payments received from insurance agencies; and 7) other income which is small in size.

Total monetary outlays include: 1) purchases at retail stores (except for second hand goods); 2) purchases at village markets from public farms; 3) rent and utilities; 4) purchases of services from the public sector, except for housing-communal services; 5) taxes and other transfers to the state budget; 6) insurance premiums; 7) membership dues, including payments to housing cooperatives; and 8) total additions to savings, both organized and unorganized. Both income and outlays exclude transactions within the household sector because in Soviet national accounts these transactions do not increase total monetary revenues of households.

The total wage gap increased from 13.9 to 29.8 billion rubles during 1970-1984. CIA analysts never explain how they derive their estimates for military pay. In 1970, the size of the armed forces was approximately 4.7 million men. Wage earners numbered around 1.2 million (professional military -- 0.9 and civilian personnel -- 0.3), while draftees -- around 3.5 million.²⁴

In 1970, the average pay of draftees was around 7 rubles a month.²⁵ All draftees received monetary income in the amount of 0.3 billion rubles. If the CIA figure for total military pay is based on well informed sources, then in 1970 total wages paid by the military administration amounted to 3.1 (3.4-0.3) billion rubles, of which other earnings (primarily business expenses) comprised approximately 5 percent or 0.2 billion rubles, and regular wages -- 2.9 billion rubles. Their average monthly salary thus equaled 200 rubles. The growth of average wages in the entire Soviet economy was 150 percent between 1970 and 1984. It follows then that in 1984 the average monthly salary in the military administration was around 300 rubles, and total wages--6.8 billion rubles (based on the assumption that the number of wage earners reached 1.7 million). Draftees currently receive around 10 rubles a month, while their total income reached 0.5 billion rubles in 1984 (based on the number of draftees that equaled 4 million).²⁶ Total wages of the military administration reached 7.3 billion rubles in 1984.

Determined as a residual, total wages of defense industrial employees increased from 10.5 to 22.5 billion rubles during 1970-1984. If one assumes that other earnings increased from 0.5 to 1 billion rubles, then regular wages of defense industrial employees increased from 10 to 21.5 billion rubles, while their average monthly wages increased from 208 to 350 rubles. In comparison, average monthly wages in the fuel sector, which has the highest paid jobs in the civilian sector, increased during the same period from 201 to 310 rubles. Average wages of the engineering-technical personnel working in the civilian MBMW sector increased

from 170 to 225 billion rubles, while those of the entire MBMW labor increased from 135 to 208.²⁷ It thus appears that wage scales in the defense industry are higher than those in the comparable civilian industry by more than 1.5 times.

11.4.7 Gap in Social Security Revenues

All Soviet organizations without exception make social security payments whose size depends on the wage fund and deduction rate. The rate for civilian aircraft and ammunition production industries is 7.3 percent, while the rate for the administration sector is 5.5 percent.²⁸ If one combines these rates with the derived wages of defense employees, then social security payments equaled 0.9 (0.7+0.2) billion rubles in 1970. The problem with this estimation approach is that rates for the entire defense industry and the armed forces must be much higher than 7.3 and 5.5 percent because of inflated wage scales in these sectors that guarantee larger pensions. For example, the fuel and metallurgy sectors, where wage scales are highest in the Soviet civilian economy, have rates that exceed 9 percent. If applies the 1.5 coefficient to the above derived figure of 0.9 billion rubles, then social security payments would equal 1.3 billion rubles. By 1984, it would reach 3.1 billion rubles.

Gaps of the same size can be found in budgetary statistics on total revenues of the social security system for 1970.²⁹ These gaps equal the difference between total revenues and the sum of social security payments made by production and service sectors and revenues received from households. The existence of this gap serves as the final proof that the output of defense industries is excluded from the GSP and national income.

11.4.8 Gap in Science Expenditures

Planners divide total current outlays on science into seven parts: outlays on services performed for profit-seeking enterprises, budgetary outlays on geological works, budgetary outlays on agricultural-related research, budgetary outlays on basic civilian research, budgetary outlays on applied civilian research, budgetary outlays on the space program, and on basic and applied defense research.³⁰ Most applied civilian research is financed by means of contracts made with profit-seeking sectors and hence is not budget-supported by definition. The total cost of this research is estimated here as the difference between total current outlays and budgetary outlays on science.

The objective then is to disaggregate total budgetary outlays on science into civilian and defense components. There is information in the official statistics and secondary Soviet sources on the value of geological and agricultural research works as well as on budgetary outlays on applied civilian research. The latter consists primarily of operational expenditures in industry financed from the state budget and All-Republic budgetary outlays on science. Soviet authors also report that total basic research, both civilian and defense, comprises 9-10 percent of total outlays on science.

It is thus possible to estimate the total cost of applied defense research and space programs as a residual, which can be demonstrated to equal total defense science expenditures. This conclusion is based on two observations. First, investment into space facilities is the biggest cost item in budgets of space agencies

and that many space activities are military-related. Second, the difference between current outlays on basic defense research and civilian-related space activities is quite insignificant in size. The structure of outlays on defense science is assumed to be the same as those on the entire science sector. Outlays on defense science more than doubled from 3.3 to 7.2 billion rubles and steadily comprised 35 percent of total outlays on science during 1970-1984.

11.4.9 Military Pensions and Stipends

The analysis of pension recipients indicates that retired armed forces personnel and veterans of war receive income from a separate fund which by Western convention must be included in the defense budget. It is assumed here that the ratio between military and total pensions approximately equals the ratio between the number of military pension recipients and the total number of pensioners.³¹ Pensions of military personnel, which are above the average, are counterbalanced by pensions of veterans and those disabled, which are below the average. Military pensions increased from 1.8 to 4.1 billion rubles. Military stipends are arbitrarily assumed to equal around 10 percent of total stipends or 0.2-0.3 billion rubles.

11.4.10 Other Defense Expenditures

There are four other types of defense expenditures that are peculiar to the Soviet system of national accounts. These expenditures include: 1) material and labor outlays of defense planning agencies and paramilitary volunteer organizations; 2) material and labor outlays of household services directly involved in military buildup; 3) material and labor outlays of T&C sectors providing support to the armed forces; and 4) net investment into all sectors participating in military buildup (except for defense construction). It is assumed here that 10 percent of all outlays on state administration (0.4-0.8 billion rubles), 2.5 percent of all outlays on household services (1.2-2.1 billion rubles), and 50 percent of all outlays on budgetary T&C (0.9-1.9 billion rubles) are defense-related.³² Net investment is determined here as the difference between total investment into defense sectors and placement cost of capital employed in defense sectors. It increased from 1.9 to 3.9 billion rubles. Altogether, other expenditures increased from 4.4 to 8.7 billion rubles during 1970-1984.

11.4.11 Total Military Expenditures

Total military expenditures are estimated here as the sum of all their parts, which increased from 49 to 112 billion rubles during 1970-1984. The cost of weapons procurement constitutes approximately 50-55 percent of total expenditures; it increased from 24.5 to 58 billion rubles. Operational cost of maintaining the armed forces (without defense construction) increased from 11.6 to 29.1 billion rubles--it constitutes the second largest component of military expenditures of 24-26 percent. Science outlays and defense construction respectively constitutes 6.4-6.6 and 5-8 percent of the total.

11.5 GROWTH OF MILITARY EXPENDITURES

The above estimates are in current rubles. In order to analyze the growth of Soviet military expenditures, it is necessary to estimate their size in constant rubles. Since information on Soviet military activities in constant prices is not available, the researcher has no other choice but to convert the value of defense material, capital and labor inputs from current to constant prices. Another problem concerns the selection of the base year--1970 seems to be the most popular choice among both Soviet officials and Western analysts.

The authors of the official statistical publications choose 1970 as a base year for propagandistic reasons to advertise the spectacular growth rates. During the span of two decades analyzed in this study the price index is highest for 1970. This certainly contributes to the overestimation of growth rates. Soviet officials repeated their strategy with respect to 1975 as well by depressing prices compared to that year. CIA analysts choose 1970 as a base year for a different reason. Their detailed estimates of the Soviet economic structure were performed only for that year. This fact seriously undermines the validity of their industrial price indexes and hence their estimates of Soviet military expenditures in 1970 rubles for the entire period ending in 1980.

In this study, production price indexes are estimated by comparing the output of particular sectors in current and constant prices for each year of the observed period.³³ The output in current prices is estimated as the sum of production outlays and profit, while data on the output in constant prices can be extracted from the official statistics. MBMW and other heavy industrial products comprise around 60 percent of total Soviet military expenditures. Since the MBMW price index has steadily declined during the observed period, the derived amount of Soviet military expenditures in current prices is smaller than the amount estimated in constant prices.

The price index for defense industrial labor is estimated in two steps. First, it is observed that the ratio between the growth of average wages in the defense and civilian MBMW (1.09=1.68:1.54) is quite small for the 1976-1984 period and may be a result of the estimation error. Second, it is assumed here that on the basis of the above observation that the price index for defense and civilian MBMW labor inputs is the same. This price index is then estimated as the ratio between labor outlays of the civilian MBMW in current and constant prices.³⁴

END NOTES

¹ Despite its lack of popularity among experts of Soviet economic statistics, this approach was supported in the US intelligence community until the mid-1970s. Estimates based on this approach confirmed CIA's own low estimates of Soviet military expenditures. Advocates of this approach and CIA analysts supported their estimates with an argument that their critics overlooked the remarkable efficiency of the Soviet military machine. It is not surprising therefore that this approach was abandoned by all economists only after CIA analysts acknowledged that they over-estimated the Soviet defense production efficiency by a factor of 2 in their 1975 publication. For appropriate references on the revision of CIA estimates refer to J. Collins, *U.S.-Soviet Military Balance: Concepts and Capabilities, 1960-1980*, (Washington: McGraw-Hill Publications Co., 1980) p. 84.

² It must be emphasized that in his works on Soviet military expenditures Lee directed his criticism not against Becker's method but against the CIA's method of evaluating current production and growth of Soviet weapons. As a former CIA analyst, Lee has always had the advantage over outside observers in finding contradictions between CIA data on Soviet weapons production measured using both physical evidence and smuggled economic data. In his recent criticism of CIA's estimation methods--see his letter in *Problems of Communism*, (March-April 1985), pp. 129-131)--Lee convincingly demonstrated how flaws in CIA's computer-assisted model called "SCAM" led to the significant underestimation of Soviet weapons production growth rates. However, Lee's criticism is far from complete with respect to CIA's estimates in current rubles which are derived in large part using Becker's method of analyzing Soviet national accounts. Since in his own work Lee abandoned the direct cost approach used by the CIA and instead relied on the published Soviet statistics, he needed to demonstrate why his method was superior to that of Becker. The fact that his results were on the mark compared to results derived with physical evidence is alone insufficient as a proof that his method is superior to that of Becker and the CIA. Moreover, if physical evidence was not available and one had to judge each method on its own merit, one would have had to conclude that both Lee's and Becker's methods in their own ways contradict the inner logic of Soviet national accounts.

³ G. Duchene, *The Place of Defense Expenditure in the National Accounts of the USSR*, An Unpublished Paper (translated from French), p. 21.

⁴ P. Wiles, "Soviet Military Expenditures: Where the Scaletons Lie Buried." A paper delivered at III World Congress for Soviet and East European Studies, Washington, D.C., October 1985, pp. 2-4. The latest revision of his paper was expressed in the personal correspondence.

⁵ S. Strumilin, *Statistika i Ekonomika*, (Moscow: Nauka, 1979), p. 133, and M. Bor, *Effektivnost' Obshchestvennogo Proizvodstva i Problemy Optimal'nogo Planirovaniya*, (Moscow: Mysl', 1972), pp. 70-72. For other references refer to A. Zalkind, ed., *Dva Podrazdeleniya Obshchestvennogo Produkta*, (Moscow: Statistika, 1976), p. 23.

⁶ For the detailed discussion of the Soviet academic view refer to Section 2 of this study.

⁷ V. Suvorov, *Inside Soviet Military Intelligence*, (New York: Macmillan Publishing Company, 1984), pp. 35-36.

⁸ This fact is ascertained here by comparing the independently estimated budget of the armed forces and the official defense budget before and after 1970. The independent estimates are based on adding all expenditures of the armed forces.

⁹ The analysis of the available data base and estimation procedure are presented in Section 9.1

¹⁰ For details refer to the discussion of depreciation and net investment in Sections 4.2 and 4.5 in this study.

¹¹ For the discussion of the industrial profitability ratio refer to the preceding Section 10.3.

¹² The results of the reconstructed capital stock are presented in working table 10A.

¹³ The type of M&E purchased by the administration sector consists of automobiles purchased for the official use and all types of computer equipment--both of which are considered as M&E commissioned by budgetary organizations. M&E commissions are estimated in Section 4.5 together with other components of total additions to capital stock.

¹⁴ See Gosplan SSSR, *Metodicheskie Ukazaniya k Razrabotke Gosudarstvennykh Planov Ekonomicheskogo i Sotsial'nogo Razvitiya*, (Moscow: Ekonomika, 1974), p.616.

¹⁵ For the derivation of this view refer to Section 4.5.

¹⁶ The construction price index is derived in Section 3.6.

¹⁷ For example, see U.S. Congress, Joint Economic Committee, *U.S.S.R.: Measures of Economic Growth and Development, 1950-80*, 97th Congress, 2nd Session, 1982, p. 120.

¹⁸ Wiles, p. 5, who relied on estimates made by George Sokoloff, observed no noticeable drop in the value of the investment residual in 1972 because Sokoloff treated unfinished production in construction as part of unfinished construction.

¹⁹ Duchene, p. 44 (Tables 6, 7), made a questionable attempt to estimate net additions of fixed capital in current prices as the difference between installed capital in constant prices, which he took directly from the official statistics, and depreciated capital, which he estimated by applying the general depreciation rate to the average value of the entire capital stock. There are several problems with Duchene's approach. In contrast to his approach, Soviet planners estimate net additions as the difference between total additions and total replacement of capital. Officially reported installed capital must be converted into current prices and then increased by the amount of commissioned M&E and additions to livestock before it can be considered as total additions. Depreciation of capital consists of two components: capital replacement and depreciation. Replacement rates vary for each production sector every year. In additions, write-offs are added to the value of replaced capital for the estimation of the entire replacement cost. See Sections 4.2 and 4.5 of this study for details. All these problems with Duchene's estimates make it quite difficult to evaluate the total margin of error contained in his estimates.

²⁰ Ever since A. Becker, *Soviet National Income, 1958-1964*, (Berkeley: University of California Press, 1969), pp. 159-160, analyzed the consumption fund of national income and found no residual, Western researchers have automatically assumed that the official total for private consumption contains no residual. Instead of attempting to make independent estimates of all components comprising private consumption, Duchene, p. 21, made an unsubstantiated assumption that the military uses 5.3 percent of the total private consumption. The military agencies, however, purchase only foodstuffs through the retail trade. All other items on the military procurement list are purchased through the wholesale trade system. Unless one is willing to believe that the Soviet military has no maintenance cost, one must conclude that Becker and other researchers repeatedly overestimated some components of the private consumption fund. Independent estimates performed in this study indeed confirm the above conclusion.

²¹ See U.S. Congress, (1982), p.130.

²² This can be explained by the fact that CIA analysts have always assumed that wages of defense industrial employees comprise part of the produced national income and thus part of the total official wage fund of industrial employees.

²³ It is assumed in this study that employees engaged in transportation, supply and repair of weapons receive their wages from the military administration.

²⁴ These wage earners exclude employees of industrial and agricultural and other profit-seeking enterprises of the Defense Ministry whose output is included in the GSP.

²⁵ The information on draftees' monetary allowance is based on personal interviews with Soviet emigres.

²⁶ It is assumed here that the increase in the average monetary allowance was kept in line with the general increase of average wages of state-cooperative employees. The margin of error is quite insignificant considering that the total pay reached only 0.5 billion rubles in 1984.

²⁷ See *Vestnik Statistiki* No. 8, 1976, pp. 88-89, and *Vestnik Statistiki* No. 10, 1985, p. 75.

²⁸ Refer to T. Konyukhova, ed. *Sbornik po Finansovomu Zakonodatel'stvu*, (Moscow: Yuridicheskaya Literatura, 1980), p. 517.

²⁹ Estimates are presented in working table 6B1.

³⁰ The detailed discussion of science outlays is presented in Sections 6.1 and 6.2.

³¹ For the discussion of military pension recipients refer to Section 9.1.

³² The percentage for state administration is based on the assumption that one out of 5 employees of the central administration sector is directly involved in military matters ranging from military economic planning to running paramilitary organizations. The percentage for household services is based on the ratio between the military and the entire Soviet population. While the military use of services is much lower than that of the average urban dweller, it is also much higher than that of the family of farmers. The percentage for budgetary T&C is based on approximate estimates of all possible civilian uses for budgetary T&C services.

³³ Refer to Section 3 for the derivation of price indexes for major economic sectors.

³⁴ The value of labor inputs in constant prices in the civilian MBMW sector is estimated as the difference between total GVO MBMW in producer prices and the sum of materials (reported in the NKh table on industrial material outlays in constant prices), depreciation (estimated independently by applying MBMW and construction indexes), and net profit (reported in constant prices as part of the profitability ratio in the NKh table on this ratio).

APPENDICES

APPENDIX A : THE ORGANIZATION OF SOVIET PLANNING

In order to understand the Soviet economic structure it is necessary to examine the organization of Soviet planning, including functions of planning agencies, the decisionmaking process and the contents of the State Plan which is at the center of this process. The ultimate responsibility for designing and implementing the plan lies with the USSR Council of Ministers, which is the Soviet government. The Council coordinates the work of all regional councils and oversees the work of all committees and ministries which run the Soviet state. The Council's governing body is called "Presidium," which consists of the Chairman of the USSR Council of Ministers, his First Deputies and Deputies.

The Council's functions are presumably limited to economic and organizational matters of running the state. The Politburo, Party's ruling body, supervises and coordinates Council's activities with those of institutions in charge of political, foreign and defense matters. All Council's functions center around the draft, approval and enforcement of the State Plan of social and economic development. Once this Plan is approved by the Politburo and then by the USSR Supreme Soviet (a parliament without an independent power base), it becomes the law of the land. The activities of all Soviet organizations are set on achieving the goals specified in the State Plan.

The Council's functions determine the agenda of its Presidium meetings and the responsibilities of its members. The responsibilities of several Deputy Chairmen are known in the West. These Deputy Chairmen preside over the Presidium's committees and thus direct the work of all other planning agencies. These committees include the USSR Gosplan (the central planning committee), the USSR Gossnab (the committee for material-technological supply), the USSR State Committee for Science and Technology (GKNT), the USSR Gosstroy (the committee for construction), the Commission for Foreign Economic Relations, the Commission for CEMA Affairs (economic affairs within the Soviet block), and the Commission for Defense Industry (VPK). Although the responsibilities of five other Deputy Chairmen are unknown, one can deduce that they preside over other Presidium's commissions which coordinate the activities of machine-building industries, fuel and power industries, industries producing various industrial materials, consumer industries and agriculture. One can assume that distribution and consumer services are also supervised by the Presidium.

The above committees and commissions form what Soviet economists refer to as the first level of Soviet planning. The second level includes agencies with the ministerial status. These include: the USSR Finance Ministry, the State Committee of Prices, the State Committee on Labor and Social Questions, the State Committee on Material Reserves, the State Committee on Standards, the Central Statistical Administration (TSU), the State Bank, the State Construction Bank, the Foreign Trade Bank, the State Committee for Foreign Economic Ties, and around 50 ministries and other agencies. The USSR Academy of Sciences helps the GKNT to prepare the plan for technological innovation. Most of the above agencies have regional offices in every republic of the Union with the exception of defense agencies. The chart below is designed to depict the hierarchical arrangement of Soviet planning institutions.

While each planning committee and commission is responsible for its segment of the State Plan, the USSR Gosplan integrates the entire State Plan into one system. This hierarchical arrangement is designed to facilitate the coordination of different segments of the State Plan during both its preparatory and implementation stages. This coordination is necessary because the State Plan is used to direct the activities of the entire public sector of the Soviet economy and because mistakes in the integration of the plan can lead to production failures with disastrous consequences for the entire Soviet economic system. The ultimate responsibility for preventing this disaster rests with the USSR Gosplan, which hence can be considered the most important among Soviet government agencies.

No armaments production plan can be implemented without the prior approval of the Gosplan's Collegium, whose decisions are reached after numerous consultations with the Collegiums of other Presidium's committees and commissions. The defense plan approved by Gosplan's Collegium reflect the planners' adherence to the party leadership's political preferences. At the same time, planners must report to the party leadership on all implications of the military drive for the civilian economy. In this regard, planners must enclose their own recommendations on how to optimize the party leadership's short and long term priorities. Presumably, Gosplan decisions are announced in the name of the entire Presidium after all its members have granted their approval. The Politburo resolves only major disagreements, such as those regarding the supply of key civilian and defense industries with scarce resources, advanced technology and skilled labor force and the construction of large projects. The entire procedure for resolving these disagreements is apparently standardized.

The key role in Gosplan's decision-making process belongs to its two unified ('svodnye') sections responsible for coordinating the annual and long-term State Plan. The work of these sections is directly supervised by Gosplan's Collegium and aides to Gosplan's Chairman. These sections initiate the draft of the State Plan, monitor and compile final drafts regarding its fulfillment. Its draft begins with the procedure whereby planners establish linkages between major sectors and it ends with the integration of data on how these linkages were maintained or altered during the year. The Plan is always based on data collected for the previous year, on the overall planning objectives designed for five- and fifteen-year periods, and on changes in the party leadership's view of the economic situation. In fact, changes in the party's economic and defense policies serve as general guidelines indicating how to alter economic priorities.

The transformation of the party's economic and defense policies into the draft of the State Plan entails a long process which will be examined only generally here. First, the Politburo decides on major economic and defense guidelines based on its analysis of the previous year's achievements and changes in the international situation. Second, the Politburo orders the Secretariat (central party apparatus) to prepare detailed memoranda for planning agencies containing its views on the way the current Five-Year Plan should be changed for the following year. Third, economic experts working in numerous sections of the Secretariat discuss this memoranda with Presidium's experts. Fourth, the Presidium itself discusses the party's memoranda and establishes general guidelines that planning agencies must follow during the preparation of the Plan. Fifth, on the

basis of these guidelines Gosplan's unified sections develop general outlines of the plan and leave it to other Gosplan sections and other planning agencies to work out details. Sixth, it can be assumed that working out these details takes the most time as it involves (1) meetings of economic experts from several planning agencies responsible for preparing particular segments of the Plan, and (2) the coordinated effort of these agencies, subordinated ministries and enterprises.

The defense industrial plan must be coordinated with the following segments of the State Plan: production of energy resources, chemicals, ores, and other materials; production of machines and equipment; transportation and communication; construction, repair and geological exploration works; material-technological supply; capital production capacity; labor and wages; financial resources; material reserves; technological innovation; prices and standard; foreign trade, including export of armaments to CEMA and Third World countries; regional production and other.

The VPK working in close contact with the USSR Defense Ministry apparently presides over the coordination of the defense industrial plan with the above plans. Each planning agency has its own military administration which is responsible for coordinating this agency's plan with the defense industrial plan. The VPK must resolve all conflicts with other planning agencies responsible for meeting both defense and civilian economic needs and with the staff of the USSR Defense Ministry which must meet its own armaments procurement plan. The role of Gosplan's military administration is to coordinate the entire military plan with other segments of the State Plan. The final integration of the civilian and defense economic plans takes place when Gosplan's unified sections and military administration make the joint effort to complete the final draft of the State Plan.

Seventh, central planning agencies cannot even begin negotiations unless they receive detailed drafts of particular segments of the State Plan from subordinated ministries and enterprises. The organization of Soviet planning can thus be seen as a two-way bargaining process whereby central planning agencies set high objectives while enterprises attempt to downgrade the limits of their productive capacity and thereby increase their chances of overfulfilling planning quotas. The existing evidence indicates that enterprises enter negotiations with few bargaining chips. For example, the approved plans usually presuppose full use of resources making taut provisions for reserves. This results in chronic shortages of materials, skilled labor and financial revenues. Planners apparently face a difficult dilemma in that they are required to relegate all the best resources to the defense sector while sustaining respectable growth rates for the civilian economy. The enterprises' poor bargaining position stems from the fact that central planners can always make judgments about the enterprises' productive capacity on the basis of their previous year's performance.

APPENDIX B : TSU SECRET CODE

Perceptive students of large organizations observe that power status of bureaucrats depends on their access to information channels. The greater access corresponds to a higher power status. No other bureaucracy can better validate this axiom than the Soviet planning organization. Soviet leaders' preoccupation with secrecy is well known. However, inadequate attention has been paid to the elaborate mechanism by which Soviet leaders are able to preserve economic and military secrets. The following description of this mechanism is based on analysis of the official statistics, on accounts of Soviet leadership politics provided by Soviet defectors as well as on interviews with Soviet emigres who had access to classified data. It is remarkable how this mechanism fits hypothetical constructs of organizational theorists.

The highest office for classifying all information in the Soviet Union is the General department of the CC Secretariat. Created by Stalin, this department keeps all records of Politburo and Defense Council meetings where the most important economic and defense secrets are discussed. Upon the recommendation of Politburo members this department distributes secret memoranda to a small circle of party, state and military leaders. Such memoranda serve as the only source of information on the real civilian and defense economic trends in the country, technological and moral readiness of the armed forces, important scientific breakthroughs that have strategic implications, changes in the correlation of forces, the general satisfaction of Soviet people with party's policies, and on other top secret facts.

The general department, with the assistance of personal offices of Politburo members, devises a method of revealing the excerpts of secret memoranda to less important officials. The latter must present hard evidence in the ideologically acceptable light. In all probability, ideological distortions of facts by the Soviet propaganda machine cannot be found in documents with the first and second level of classification. After scandals with the distorted agricultural statistics of the mid-1950s, Soviet leaders made every effort to ensure the collection of the actual production and consumption data.

The exact number of classification levels designed by the general department cannot be determined. What is known, however, is that even top Soviet experts who have top clearance operate with the minimum information for completing their research. For any additional information they must fill special requests. As a rule, these experts receive a negative reply when they request information that is outside their area of specialization. Every Soviet research institution and production organization has the so-called "first section" which controls the distribution of classified data. All these sections are in turn supervised by a special KGB unit whose function is to enforce guidelines set by the CC General department. Given this department's power over the collection and dissemination of information, it is not surprising that Chernenko, the late Soviet leader, prepared his rise to the top of the Soviet hierarchy by running this department.

In every area of Soviet life there exists a secret code for presenting data in a way that would not be detrimental to Soviet national security interests or to personal interests of party leaders. The methodology for presenting economic data was apparently designed by TSU officials in the early 1950s. A successful testing of this methodology made it possible to compile the first post-war official statistical manual in 1956. The fact that major features of the TSU secret code have changed insignificantly since then and that this code has not been cracked indicates the ingenuity of the TSU experts in preserving state economic secrets.

As was emphasized in Section 1.0, the TSU secret code is designed to conceal the size of the defense allocations and their impact on the civilian economy, particularly on living standards. The code is based on a simple idea, i.e., to establish the most efficient way of withholding the publication of data on the civilian economy to render impossible the calculation of defense allocations as the difference between total allocations and those intended for civilian purposes. For ideological purposes, the TSU experts were apparently asked to present the official statistics in such a manner as to conceal the very existence of the secret code.

A successful completion of their project depended on the disinformation campaign regarding two aspects of the TSU work: 1) the place of the end military product in national accounts; and 2) the idea that some data estimated specially by Gosplan experts during the compilation of national accounts lies outside the scope of the official statistics because of its secondary importance. The level of ignorance regarding these two aspects of the TSU secret code that is evident in analyses presented by the most knowledgeable Soviet economists suggests that the disinformation campaign was never stopped. In their published works, Soviet authors still believe that the GSP and national income contain the end military product for "reasons of convenience" and that most data omitted from the official statistics is of secondary importance to the analysis of Soviet economic trends. Only a few Soviet authors publicly realize that the omission of this data may significantly distort their analysis of Soviet economic trends. They are, however, prohibited or unwilling to design a systematic approach to derive this data while operating within the constraints of the official statistics.

The introduction to the structure of the unified accounts and to methods of their compilation, which is the subject of Section 2, provides an outline of what data is omitted from the official statistics. The objective of the following discussion is to detect some hidden pattern behind the concealment of economic data by the TSU officials. In the process of comparing the official statistics with the structure of planning tables one can establish approximately five layers of missing data that may correspond to particular levels of classifying data in Soviet planning agencies. Each layer is distinguished by the degree of difficulty in deriving missing data.

The lowest fifth level includes the following data: labor, wages and profit in transportation and communication sectors serving production enterprises and households, wages and profit of the so-called other production and service sectors, the turnover tax and subsidies by sector, the net profit received from sales of main and subsidiary output, value added indicators of collective farms, social security deductions and bonus wages by sector, sources of financing capital investment, the structure of retail trade, budgetary revenues received from production and service

sectors, and demographic data (working pensioners and young adults, the number of pre-school children, and full-time students).

The fourth level includes data on wages and other earnings registered as part of production outlays, the structure of the so-called "other production outlays," transfers from production and household sectors to service sectors, the gross value of output of production and service sectors, producer price indexes, the distribution cost by sector, depreciation of capital by sector, capital investment in current prices, the structure of inventories, monetary income of civilian households, and the number of dependent women and unemployed.

The third level includes data on imports and exports in domestic rubles, the total supply of goods, the net product of the private production sector, household consumption of goods purchased through retail trade, consumption and investment of goods produced in the private sector, capital repair and net additions of capital, depreciation of residential housing, the structure of material outlays of civilian production and service sectors, planned losses, consumption and investment price indexes, unorganized household savings, the structure of budgetary revenues, and real labor and capital productivity trends by sector.

The second level includes data on the consumption of producer and consumer goods by the armed forces, material outlays of defense production and defense-related science, wages and social security deductions in all defense sectors, the structure of budgetary outlays, the real rise in population's standard of living, the number of defense sector employees, the size of the armed forces and prison population, the military and economic aid to Soviet allies, the price of civilian and defense defense space programs, the size and structure of state reserves, and the amount of annual monetary supply and fluctuations in financial reserves.

Finally, the first level contains data on total military expenditures, sources of financing military expenditures, including budgetary deficits, the effect of the defense burden on the civilian economy in general and on labor and capital productivity trends and on population's standard of living in particular, the readiness of the armed forces and defense industries for war, the size of Soviet strategic, foreign currency, financial and gold reserves, the defense scientific capability, the comparison of the defense-economic potential of the Warsaw Pact with those of the US and its NATO allies, and other top economic and defense secrets.

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